WEST VIRGINIA
GEOLOGICAL SURVEY

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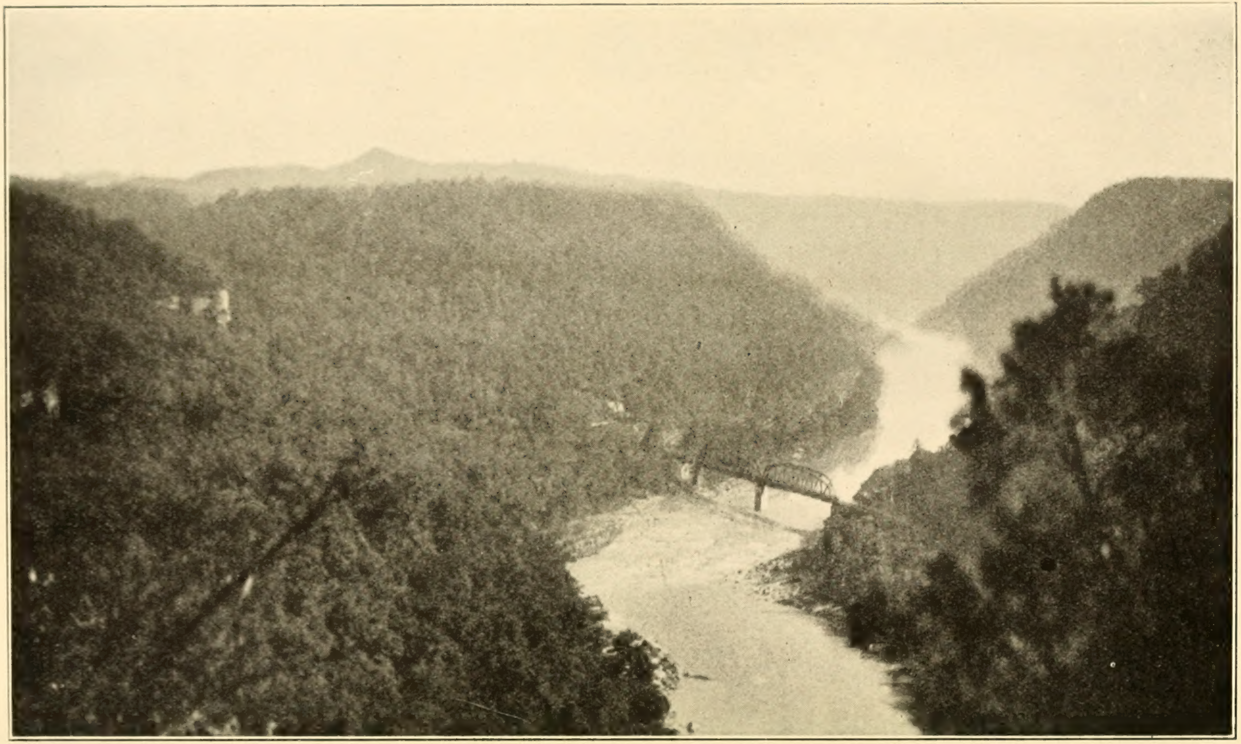

PLATE I.—View looking southeast up New River gorge, showing topography of Kanawha and New River Groups, C. & O. Railroad bridge at Hawks Nest, Lower Nuttall Sandstone cliff at left, and Alderson Knob on sky-line.

WEST VIRGINIA

GEOLOGICAL SURVEY

JUNE 20 1863

FAYETTE COUNTY

By

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I. C. WHITE, State Geologist
1919

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LETTER OF TRANSMITTAL.

To His Excellency, Hon. John J. Cornwell, Governor of West Virginia, and President of the West Virginia Geological Survey Commission:

SIR: I have the honor to transmit herewith the Detailed Report and Topographic and Geologic Maps covering Fayette County. This splendid volume full of accurate and carefully assembled data concerning the natural resources of the county in question marks the close of its author's (Ray V. Hennen) connection with the West Virginia Geological Survey. Like the other publications prepared by Mr. Hennen, this volume is replete with most valuable information upon which those interested in the mineral and other natural resources of Fayette County can rely with the utmost confidence. It is with much regret that the Survey now loses the valuable services of Mr. Hennen after a membership on its staff for more than 15 years. In view of the limited salaries available for all State officers, the State Geologist could not ask Mr. Hennen to remain longer in this service, since his compensation for private professional work brings him several times the annual salary ($3,000) which our appropriations could award. In fact, for many years, Mr. Hennen has remained on our staff at a large personal financial sacrifice simply from a sense of loyalty to his native State and to his chief under whom he has served the State so long and faithfully. It is therefore very fitting that the last work of Mr. Hennen on the Geological Survey should have been the description and mapping of the natural resources of one of the greatest coal counties of our Commonwealth, and one which for many years held the primacy in coal production over all the other counties of West Virginia. This county (Fayette) yielded the palm to McDowell in 1903, only to recover first place again in 1904, and then to yield it finally to McDowell in the next year (1905) but occupying second place in production over all the other counties of the State ever since.

From the year 1888, the first for which we have exact records of Fayette County's coal production, up to and including 1918, the output of coal in Fayette County has totaled about 250 million short tons, and probably about 265 million for the county's entire coal history, since her commercial production did not fairly begin until the Chesapeake and Ohio Railroad was opened to traffic between Richmond and Huntington in January, 1873. Based upon Mr. Hennen's field work and surveys, Mr. R. C. Tucker, of the Survey Staff, has calculated that Fayette County originally contained, in round numbers, 72 million short tons of Allegheny Coals, 2,735 million tons of Kanawha Coals, 1,410 million tons of New River Coals, and 202 million tons of Pocahontas Coals, or a total of 4,420,000,000 short tons of coal. With an estimated allowance of 20 per cent. for loss and waste in mining, there would result (4,420,000,000—884,000,000) 3,536,000,000, or over 3½ billion short tons of coal in Fayette County originally available for use, of which approximately 7½ per cent. (265 million tons) has already been taken out, leaving 3,271,000,000 short tons yet to be mined and marketed. The rapid increase in Fayette County's coal production as shown on page 375 for the past 28 years renders it practically certain that this increase will continue until it attains a maximum of 20 to 25 million tons annually at which rate it would require a period of only 130 to 160 years to exhaust the same completely. Hence the rich resources of the purest coals in the world should be carefully husbanded and not destroyed by improvident mining plans as in the past, and also through the use of the old-fashioned beehive coke ovens instead of the modern by-product process.

Fayette County is doubly fortunate not only in the possession of a vast supply of matchless coals that can not become completely exhausted for a century to come, but also in the rapid fall of a great river flowing swiftly through her center with untold capabilities in the generation of electric power that can either be used for manufacturing purposes within her own borders, or transported by wire to both near and distant users. The great resources of the New River for this purpose should not be permitted longer to run unused to the sea, but should be utilized in order to prolong the all too brief duration of Fayette's splendid coal fields. With the rocky banks and bottom of the New River gorge, dams of 50 to 100 feet in height, can, with the aid of modern engineering skill, be constructed so as to be absolutely safe from giving away during floods, etc., and the State should speedily enact the legislation necessary to secure the utilization of this great source of power now going to waste. There is a descent of 670 feet in the 89 miles between Hinton and Gauley Bridge in the flow of New River's immense volume of water, Kanawha Falls, 2 miles below its mouth, being the only point where any of its water is utilized for power within the State.

I. C. WHITE,
State Geologist.

Morgantown, W. Va.,
June 15, 1919.

CONTENTS.

Page

Members of Geological Survey Commission and State Board of Control.................................... iii

Members of Scientific Staff.............................. v

Letter of Transmittal.................................... vi-viii

Table of Contents.. ix-xiv

List of Illustrations..................................... xv-xviii

Author's Preface... xix-xxiii

Introductory Note by I. C. White on Bore Hole Records Received too late to be embodied in the volume proper.... xxiv-xxxii

Errata xxxiii

PART I. HISTORY AND PHYSIOGRAPHY.

Chapter I.—Historical and Industrial Development............ 1-31

- Location 1
- Transportation 2-18
  - Water Ways... 2-9
  - Steam Railroads.. 9-15
  - Highways 15-18
- General Description...................................... 18-31
  - Miscellaneous Items.................................... 18-20
  - Towns and Industries................................... 21-29
  - Climate 29-31

Chapter II.—Physiography.................................. 32-85

- Physiographic Changes.................................... 32-37
  - Table of Stream Data................................... 33-36
- Drainage Basins.. 37-83
- Topographic Features..................................... 84-85

PART II.—GEOLOGY.

Chapter III.—Structure.................................... 86-96

- Method of Representing Structure......................... 86-90
- Detailed Structure....................................... 90-96
  - General Features....................................... 90-91
  - Description of Folds................................... 91-95
  - Unconformities and Absence of Faults................... 96

Chapter IV.—Stratigraphy—General and Special Sections..... 97-223

- Introduction 97-98
- General Sections, Allegheny, Pottsville and Mauch Chunk Series 98-113
- Special Sections, by Magisterial Districts............... 113-220
  - Falls District... 113-143
  - Kanawha District....................................... 144-169
  - Mountain Cove District................................. 169-174
  - Nuttall District....................................... 174-180
  - Fayetteville District.................................. 180-195

Page
Sewell Mountain District.............................. 195-205
Quinnimont District.............................. 205-220
Summary 221-223

Chapter V.—Stratigraphy—Allegheny Series................ 224-229
General Description.............................. 224
Description of Members.............................. 225-229
Upper Kittanning Coal.............................. 225
Upper East Lynn Sandstone.............................. 225-226
Middle Kittanning or "North Coalburg" Coal............ 226-227
East Lynn Sandstone.............................. 227-228
No. 5 Block (Lower Kittanning) Coal.................. 228-229
Kittanning Sandstone.............................. 229
Clarion Coal.............................. 229

Chapter VI.—Stratigraphy—Kanawha Group of Pottsville Series 230-293
General Account.............................. 230-231
Description of Members, Kanawha Group.................. 231-278
Homewood (Roaring Creek) Sandstone.................. 231-232
Stockton "A" (Upper Mercer?) Coal.................. 232-233
Kanawha Black Flint.............................. 233-234
Stockton (Lower Mercer?) Coal.................. 234-235
Upper Coalburg Sandstone.............................. 235-236
Coalburg Coal.............................. 236-239
Rowlesburg (Preston County) Section.................. 237-239
Little Coalburg Coal.............................. 240
Lower Coalburg Sandstone.............................. 240
Buffalo Creek Coal.............................. 240
Buffalo Creek Limestone.............................. 240
Upper Winifrede Sandstone.............................. 240-241
Winifrede Coal.............................. 241
Lower Winifrede Coal.............................. 242
Lower Winifrede Sandstone.............................. 242
Chilton "A" Coal.............................. 242
Winifrede Limestone.............................. 243-244
Upper Chilton Sandstone.............................. 244
Chilton Coal.............................. 244-245
Lower Chilton Sandstone.............................. 245
Little Chilton Coal.............................. 245
Hernshaw Sandstone.............................. 245
Hernshaw ("Black Band") Coal.............................. 246-247
Williamson Sandstone.............................. 247
Dingess Limestone.............................. 247-248
Williamson Coal.............................. 248
Upper Cedar Grove Sandstone.............................. 248-249
Seth Limestone.............................. 249
Cedar Grove Coal.............................. 249-250
Peerless Sandstone.............................. 251
Alma Coal.............................. 251-252
Monitor (Logan) Sandstone.............................. 252
Campbell Creek Limestone.............................. 252
Campbell Creek Coal.............................. 253-254

Page
Lower Campbell Creek Coal........................... 255
Brownstown Sandstone........................... 255
Powellton "A" Coal........................... 256
Powellton (Brownstown) Coal........................... 256
Stockton (Cannelton) Limestone........................... 257-258
Matewan Coal........................... 259
Matewan Sandstone........................... 259
Eagle "A" Coal........................... 259
Eagle Sandstone........................... 259-260
Eagle Coal........................... 260-261
Decota Sandstone........................... 261
Little Eagle Coal........................... 262-263
Eagle Limestone and Shale........................... 263-265
Little Cedar Coal........................... 265
Lower War Eagle Sandstone........................... 266
Lower War Eagle Coal........................... 266-267
Upper Gilbert Sandstone........................... 267-268
Glenalum Tunnel Coal........................... 268-269
Lower Gilbert Sandstone........................... 269
Gilbert Shale........................... 270
Gilbert Coal........................... 271
Dotson Sandstone........................... 271-273
Douglas Coal........................... 273-274
Lower Dotson Sandstone........................... 274-275
Douglas Shale........................... 275
Lower Douglas Coal........................... 276-278
Age of Kanawha Group........................... 279-293
Fossil Flora........................... 279
Fossil Fauna........................... 279-293
Type Locality of Winifrede Limestone (by W. A. Price). 286-293

Chapter VII.—Stratigraphy—New River Group, Pottsville Series 294-322
General Account........................... 294-295
Description of Members........................... 295-322
Upper Nuttall Sandstone........................... 295-296
Iaeger "B" Coal........................... 297
Lower Nuttall Sandstone........................... 297-299
Iaeger (Hughes Ferry) Coal........................... 299-303
Lower Iaeger Coal........................... 303
Lower Iaeger Shale........................... 304
Harvey Conglomerate Sandstone........................... 304-305
Castle Coal 305-306
Guyandot Sandstone........................... 307
Sewell "B" Coal........................... 307-309
Sewell "A" Coal........................... 309
Lower Guyandot Sandstone........................... 309-310
Hartridge Black Shale........................... 310
Sewell Coal........................... 310-311
Welch Sandstone........................... 311
Welch Coal........................... 312-313
Upper Raleigh Sandstone........................... 313-314
Little Raleigh "A" Coal........................... 315
Little Raleigh Coal........................... 315-316
Lower Raleigh Sandstone........................... 317

Page
- Beckley Coal 317
- Quinnimont Sandstone 318
- Quinnimont Shale 318
- Fire Creek (Quinnimont) Coal 319-320
- Little Fire Creek Coal 320-321
- Pineville Sandstone 321-322

Chapter VIII.—Stratigraphy—Pocahontas Group, Pottsville Series 323-331
- General Account 323-324
- Description of Members, Pocahontas Group 324-331
  - Flattop Mountain Sandstone 324-325
  - No. 7 Pocahontas Coal 325
  - Pierpont Sandstone 325-326
  - Royal Shale 326-327
  - No. 6 Pocahontas Coal 327-328
  - No. 4 Pocahontas Coal 328
  - Upper Pocahontas Sandstone 328-329
  - No. 3 Pocahontas Coal 329
  - Lower Pocahontas Sandstone 329
  - No. 2 Pocahontas Coal 330
  - No. 1 Pocahontas Coal 330
  - North Fork Shale 330-331

Chapter IX.—Stratigraphy—Mauch Chunk Series, Mississippian 332-335
- General Description 332-333
- Description of Members 333-335
  - Princeton Conglomerate Sandstone 333-334
  - Terry Limestone 335

PART III.—MINERAL RESOURCES.

Chapter X.—Petroleum and Natural Gas 336-373
- Oil and Gas Horizons in West Virginia 336-338
- Description of Oil- and Gas-Bearing Sands 338-340
- Well Records and Prospective Oil and Gas Areas 340-373
  - Summarized Records 340-341A
  - Falls District 342-349
  - Mountain Cove District 349-350
  - Kanawha District 350-355
  - Nuttall, Sewell Mountain and Quinnimont Districts 355-359
  - Recent Oil and Gas Development in Kanawha County 359-372
    - The Cabin Creek Pool 359-372
  - Fayetteville District 373

Chapter XI.—Coal and Coke 374-903
- Statistics of Coal Production 374-385
- Minable Coal Beds in Fayette County 385
- Records of Coal Test Borings 385-455
  - Table of, Summarized 388A-388C
  - Falls District 389-395
  - Kanawha District 395-401
  - Mountain Cove District 401-403
  - Nuttall District 403-404

Page
    - Fayetteville District ... 404-442
    - Sewell Mountain District ... 442-449
    - Quinnimont District ... 449-455
- Minable Coals of the Allegheny Series ... 455-469
    - Middle Kittanning (North Coalburg) Coal ... 456-461
    - No. 5 Block (Lower Kittanning) Coal ... 461-469
- Minable Coals of the Kanawha Group, Pottsville Series ... 470-676
    - Stockton Coal ... 470-474
    - Coalburg Coal ... 474-480
    - Winifrede Coal ... 480-483
    - Chilton Coal ... 484-487
    - Cedar Grove Coal ... 488-492
    - Alma Coal ... 492-498
    - Campbell Coal (Peerless and No. 2 Gas) Coal ... 498-578
    - Powellton Coal ... 578-613
    - Eagle Coal ... 613-647
    - Little Eagle Coal ... 647-658
    - Glenalum Tunnel Coal ... 658-662
    - Gilbert Coal ... 662-672
    - Douglas Coal ... 672-676
- Minable Coals of the New River Group, Pottsville Series ... 676-849
    - Sewell Coal ... 676-795
    - Fire Creek (Quinnimont) Coal ... 795-849
- Minable Coals of the Pocahontas Group, Pottsville Series ... 849-866
    - No. 6 Pocahontas Coal ... 850-860
    - No. 3 Pocahontas Coal ... 861-866
- Summary of Available Coal by Districts ... 866-868
- Minable Coal by Magisterial Districts ... 868
- Tables of Coal and Coke Analyses ... 869-903
    - Table 1—Coal Analyses by W. Va. Geological Survey ... 871-877
    - Table 2—Coke Analyses by W. Va. Geological Survey ... 881
    - Table 3—Coal Analyses by U. S. Geological Survey and U. S. Bureau of Mines ... 883-894
    - Table 4—Coals Analyzed for the United States Government during the Fiscal Years 1908-1915 ... 897

Chapter XII.—Clays, Road Material, Building Stone, Glass-Sand, Water-Power, and Forests ... 904-924
- Clays ... 904-907
    - Absence of Development ... 905
    - Available Clay ... 905-907
        - Transported Clay ... 905-906
        - Residual Clay ... 906
        - Stratified Shales ... 906-907
        - Fire Clay ... 907
- Road Material ... 908-909
    - River and Creek Gravel ... 908
    - Limestone ... 908
    - Sandstone ... 908-909
    - Brick ... 909
- Building Stone ... 909-911
    - Quarries ... 909-910
    - Available Stone ... 910-911
- Glass-Sand ... 911-913
    - Quarries ... 911-912

Page
Available Sand.. 912-913
Water-Power.. 913-922
Present Development.. 913-914
Available Water-Power.. 914-922
Forests.. 922-924
The Original Forests.. 922
The Lumber Industry.. 922-923
The Present Forest Conditions.. 923
Areas Suitable for Reforestation.. 923-924

Appendix "A"—Some Revisions in Correlation for Members of Kanawha Group in Mingo County, West Virginia.... 925-928

Appendix "B"—Levels Above Mean Tide.. 929-946
Railroad Levels.. 929-935
U. S. Geological Survey Levels.. 936-946

Index.. 947

ILLUSTRATIONS.

Maps I and II in Atlas (Under Separate Cover).

Map I—Showing Topography of Fayette County.
Map II—Showing General and Economic Geology, Structure Contours, and Test Well Borings for Oil, Gas, and Coal.

Plates.

No. Facing Page.

I.—View looking southeast up New River gorge, showing topography of Kanawha and New River Groups, C. & O. Railroad bridge at Hawks Nest, Lower Nuttall Sandstone cliff at left, and Alderson Knob on sky-line....................Frontispiece

II.—View of Montgomery looking northward, showing topography of Kanawha Group, the Kanawha River, and main building of Preparatory Branch, W. Va. University, at left foreground.. 24

III.—View showing western end of Montgomery, U. S. Lock and Dam No. 2 on the Kanawha River, and topography of the Kanawha Group.. 48

IV(a)—Showing Falls of the Kanawha River across the great Lower Nuttall Sandstone ledge, just above Kanawha Falls station on the C. & O. Railroad............................ 80

IV(b).—Another view of the same Falls and also of the town of Glen Ferris on northwest bank of Kanawha River........... 80

V.—View looking north across New River at Gauley Junction, showing topography of Kanawha and New River Groups, Upper and Lower Nuttall Sandstone cliffs, Guyandot Sandstone in bed of river, and C. & O. Railroad bridge............ 128

VI(a).—View looking northeast, showing New River gorge just below Nuttallburg, topography of Kanawha and New River Groups, and outcrop of the great Lower Nuttall Sandstone near top of valley wall.................................... 160

VI(b).—View looking northward, just below Kaymoor, showing the topography of Kanawha and New River Groups, and the outcrop of the great Lower Nuttall Sandstone along the north valley wall of New River........................... 160

VII(a).—Looking due north across the valley of Sewell Creek at Myles Knob of Sewell Mountain on sky-line, showing topography of New River and Pocahontas Groups and Mauch Chunk Series, the cultivated fields being in the latter........ 192

VII(b).—Looking northward at Sims Mountain, just south of Rainelle, showing fine farm surrounded by forests............... 192

Facing Page

VIII(a).—Typical scenery along New River, looking southeast from C. & O. Railroad bridge at Hawks Nest; white cliffs in background are Lower Nuttall Sandstone 224

VIII(b).—One of most picturesque views in Fayette, looking towards Newlyn from west valley wall of New River, showing topography of New River Group and Lower Nuttall Sandstone cliffs near sky-line 224

IX(a).—View looking northwest down Gauley River at Carnifex Ferry at mouth of Meadow River, showing topography of New River Group and Guyandot Sandstone cliffs at water-level on left 224

IX(b).—View looking northwest across Sewell Creek Valley from east slope of Bacon Knob of Sewell Mountain ridge on sky-line, showing topography of New River and Pocahontas Groups and Mauch Chunk Series 256

X(a).—View looking northeast from road summit 1½ miles northeast of Ravenseye, showing corn and buckwheat in shock on left and farms typical of plateau region of Fayette County 288

X(b).—View looking northwest from Gatewood across plateau upheld by Upper Nuttall Sandstone, the mountain ridge on sky-line being in Kanawha Group and 3 miles west of Fayetteville 288

XI.—View of "Lover's Leap Rock" on north hillside of New River just below Hawks Nest, formed from cliff exposure of upper portion of Lower Nuttall Sandstone, exhibiting current-bedding in latter 320

XII.—View showing outcrop exposures of Lower Nuttall (upper cliff) and Harvey Conglomerate Sandstones at "Lover's Leap Rock" shown on Plate XI 352

XIII.—View showing Falls in Wolf Creek northeast of Fayetteville over one of the sandstone ledges of the New River Group 384

XIV.—View showing concentric iron bands inclosing concretionary masses in the Nuttall Sandstone in west edge of Fayetteville, characteristic of this ledge in Fayette and Raleigh Counties 416

XV.—View showing Fayette County National Bank building at Fayetteville, constructed with stone obtained at local quarries in Upper Nuttall Sandstone ledge 448

XVI.—View looking westward at Cotton Hill Knob on sky-line, showing topography of Kanawha and New River Groups, Long Branch on left and coal tipple for Mine No. 33 on Map II on right 480

XVII(a).—View showing 4½ feet of No. 2 Gas Coal at opening on east side of Paint Creek, 1 mile north of Milburn, Photo by C. E. Krebs 512

Facing Page

XVII(b).—View showing 4½ feet of Powellton Coal at opening near that above. **Photo by C. E. Krebs**.................... 512

XVII.—View showing coal tipple at Summerlee (formerly Parral) Shaft Mine—No. 144 on Map II—in the Sewell Coal bed (see pages 726-7 for description)................................ 544

XIX.—View showing coal tipple and incline railway to opening in Sewell Coal of Marr Branch Coal Co., on west hillside of New River at Whitney; cliffs of Lower Nuttall Sandstone near sky-line. **Photo furnished by C. E. Krebs**.............. 576

XX(a).—View of the coal mining town of Kingston, looking south **Photo by A. M. Hagan**.. 608

XX(b).—View of the coal mining town of Mahan on Paint Creek, looking southwest and showing topography of the Kanawha and New River Groups.. 608

XXI.—View 1 mile northward from Landisburg, looking northwest down Manns Creek and showing cliffs of Upper Raleigh Sandstone on right and ground strewn with boulders of latter on left 640

XXII.—View showing quarry of New River Silica Co., in Upper Raleigh Sandstone on east hillside of New River, ½ mile northeast of Ephraim. (See pages 911-912 for description).... 672

XXIII.—View showing sandstone quarry—No. 9 on Map II—½ mile southwest of Meadowbridge (Clute P. O.) in the Princeton Conglomerate of Mauch Chunk Series; high ridge on left sky-line is in Pocahontas Group.............................. 704

XXIV.—View showing lumber yard and company store at Landisburg, typical of the lumber industry in West Virginia, and topography of the New River Group........................ 736

Figures.

No. Page.

1. Map showing progress of Topographic and Detailed County Geologic Surveys to September 1, 1918.................... xx
2. Map showing position of Fayette County in West Virginia... xx

2(a). Map showing location of bore holes of Low Moor Iron Co. of Virginia... xxv

3. Diagram showing intervals in feet between Coal Beds of the Allegheny Series and Kanawha Group, Pottsville Series, in Fayette County.. 386
4. Diagram showing intervals in feet between Coal Beds of the New River and Pocahontas Groups, Pottsville Series, Fayette County.. 387
5. Map showing approximate minable area of the Middle Kittanning ("North Coalburg") Coal............................ 457
6. Map showing approximate minable area of the No. 5 Block (Lower Kittanning) Coal.................................. 462

Page
7. Map showing approximate minable area of the Stockton Coal 472
8. Map showing appoximate minable area of the Coalburg Coal 475
9. Map showing approximate minable area of the Winifrede Coal 482
10. Map showing approximate minable area of the Chilton Coal 486
11. Map showing approximate minable area of the Cedar Grove Coal 489
12. Map showing approximate minable area of the Alma Coal... 494
13. Map showing approximate minable area of the Campbell Creek (Peerless and No. 2 Gas) Coal.................... 499
14. Map showing approximate minable area of the Powellton (Brownstown) Coal.................................. 580
15. Map showing approximate minable area of the Eagle Coal. . 615
16. Map showing approximate minable area of the Little Eagle Coal 648
17. Map showing approximate minable area of the Glenalum Tunnel Coal 660
18. Map showing approximate minable area of the Gilbert Coal.. 664
19. Map showing approximate minable area of the Douglas Coal.. 673
20. Map showing approximate minable area of the Sewell Coal.. 678
21. Map showing approximate minable area of the Fire Creek (Quinnimont) Coal................................... 797
22. Map showing approximate minable area of the No. 6 Pocahontas Coal... 851
23. Map showing approximate minable area of the No. 3 Pocahontas Coal... 862

AUTHOR'S PREFACE.

This volume (See Table of Contents) is divided into three parts as follows: **Part I**—History and Physiography, Chapters I and II; **Part II**—Geology, Structural and Stratigraphical, Chapters III to IX, inclusive; and **Part III**—Mineral Resources, Chapters X to XII, inclusive. Two maps accompany the volume in a separate atlas; viz, **Map I,** showing Topography, and **Map II,** showing the General and Economic Geology, and test well borings for oil, gas and coal. The latter also exhibits the structure or inclination of the strata by three sets of contours, those in **green** showing the approximate elevation **above sea-level** of the base of the No. 2 Gas Coal; those in **red,** the same for the base of the Sewell Coal; and those in **black** outside Fayette in Kanawha County, the elevation **below sea-level** of the top of the Berea Sand. In addition to these separate maps, there are 32 Plates and 24 Figures embodied in the Report.

In Chapter III on Structure attention is called to the two tables of intervals between important members of the rock column, the first, on page 88, being based on the No. 2 Gas Coal bed; and the second, page 89, on the Sewell Coal. A liberal use of these tables in conjunction with both the topographic and structure contours shown on Map II, should enable the layman to determine at any point within the County the approximate elevation above sea-level of the coals and other important members designated in the tables in question, or other members intimately associated with them but not listed.

In order to show the true position of the several members of the rock column, it was found necessary to measure and compile a large number of special sections of both the surface and the underground strata, the most of which are embodied in Chapter IV. Such material should be of special interest to the engineer, geologist, and the coal, oil and gas operators. The description of separate members of the Alle-

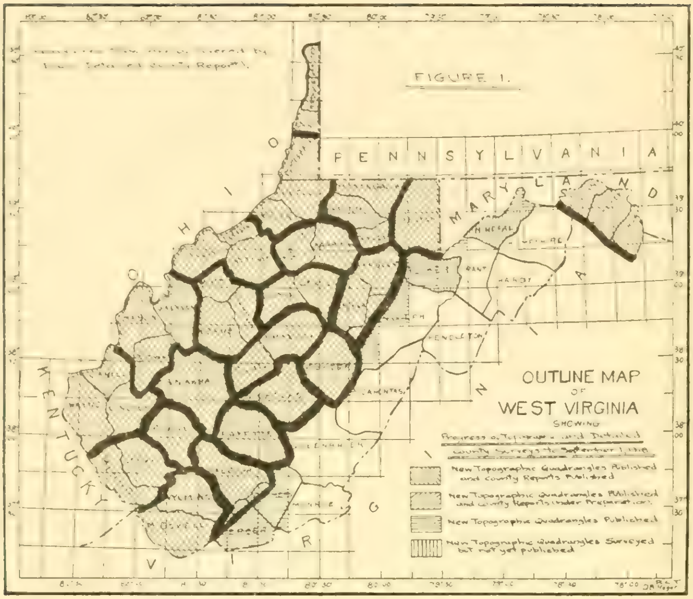
FIGURE 1.
OUTLINE MAP
OF
WEST VIRGINIA
SHOWING
Progress of Topographic and Detailed
County Surveys to September 1, 1918
New Topographic Quadrangles Published and County Reports Published
New Topographic Quadrangles Published and County Reports under Preparation.
New Topographic Quadrangles Published
New Topographic Quadrangles Surveyed but not yet published
PENNSYLVANIA
MARYLAND
OHIO
KENTUCKY
VIRGINIA
KANAWHA
FAYETTE
PENDLETON
HARDY
MINERAL
McDOWELL

Figure 1.—See explanation on Figure.

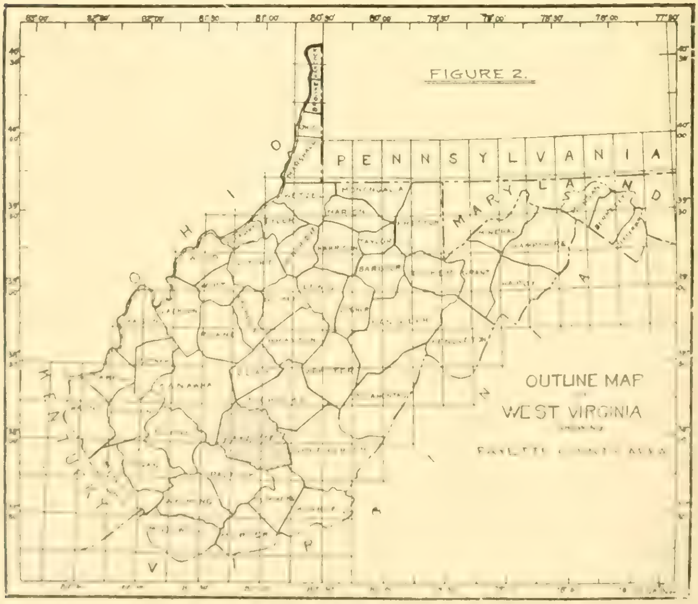

Figure 2.—See explanation on Figure.

gheny Series is given in Chapter V; of the Kanawha Group, in Chapter VI; of the New River Group, in Chapter VII; of the Pocahontas Group, in Chapter VIII; and of the Mauch Chunk Series, in Chapter IX.

The attempts to open petroleum and natural gas pools in Fayette County have been successful in only a slight degree for the latter near Montgomery and just southwest of Belva. All the wells that have been completed within Fayette, as also a large number of wells including most of the Cabin Creek oil pool of Kanawha County are shown on Map II, many of which are listed by serial numbers and described in Chapter X. In the latter, special attention is called to Prospective Oil and Gas Territory by magisterial districts and page references in the Index under that heading.

In Chapter XI a description is given of the 20 separate minable coal beds along with that for about 200 commercial mines, several hundred prospect and other openings, all of which are designated consecutively both on Map II and in the text by Nos. 1 to 603, inclusive. The description of any mine, opening or exposure may be quickly found in the text by reference to the heading in the Index: **"Mines, Coal, by Numbers"**, where all are arranged in consecutive order. Figures 4 to 23, inclusive, published in the same Chapter and page-referenced in the Table of Contents, show at a glance the regions in which the several coal beds are believed to attain minable development. Some of these minable coals are too thin and impure in certain localities to be profitably worked and for that reason arbitrary lines of disappearance are shown, but it must be kept in mind that there are probably small local patches of good coal in the regions indicated as barren for any bed, and likewise small areas within the shaded region where the coal may be thin and worthless. Such a representation can show only the approximate area of minable coal, and in regions where doubt exists, the information given in the text should be consulted freely for the character of the bed in question. The stream work on these figures is accurate since the maps are photographic reductions of the drainage as exhibited on Map I, the latter having as its base the accurate topographic sheets of the U. S. Geological Survey.

The author spent the field season of 1916 in gathering data for this report, and was aided on this work about six weeks by D. D. Teets, Jr. R. C. Tucker and A. M. Hagan assisted in the office work, doing most of the drafting and compiling and arranging most of the tabular matter under the author's directions. During the latter part of February and the first of March of this year, A. M. Hagan visited several of the coal mines on Paint Creek and collected coal samples for analysis and calorific tests. The chemical analyses and calorimetric results, except those which have been taken from former W. Va. Geological Survey Reports and those of the U. S. Geological Survey and the U. S. Bureau of Mines, were mostly determined by J. Berghius Krak, Assistant Chemist, under the supervision and with the assistance of B. H. Hite, Chief Chemist. These are grouped into four tables at the end of Chapter X, as follows:

Pages.

Table 1.—Coal Analyses determined largely in the laboratories of the W. Va. Geological Survey 871-877

Table 2.—Coke Analyses determined in the laboratories of the W. Va. Geological Survey 881

Table 3.—Coal Analyses determined in the laboratories of the U. S. Geological Survey and U. S. Bureau of Mines 883-894

Table 4.—Coals Analyzed for the United States Government during the Fiscal Years 1908-1915 by the U. S. Geological Survey 897

Owing to the reduced appropriations for Survey work, resulting in curtailment of the chemical staff, only a limited number of coal samples were collected, but the wide range covered by the four tables above mentioned should give a fair idea of the composition and character of the minable coal beds in Fayette County.

Special acknowledgment is made here for the hearty manner, with few exceptions, in which the coal, oil, and gas operators and other individuals cooperated in furnishing valuable records of well borings, sunk at private expense, and likewise for valuable information obtained from engineers, managers, and superintendents of the several companies engaged in the development of the mineral and other resources of the County. Due credit for all such material received is given in the text.

Finally, as in previous Reports, the author is pleased to acknowledge the receipt of valuable suggestions from Dr. I. C. White, State Geologist, in the preparation of this Report.

RAY V. HENNEN.

Morgantown, W. Va.,
June 21, 1918.

Note:—Attention is called to Appendix "A"—"Some Revisions in Correlation for Members of Kanawha Group in Mingo County, W. Va.," in which the Dingess Coal is shown to correlate with the Williamson bed and a corresponding revision of that portion of the General Section of the Kanawha Group for southern West Virginia as given on page 102 of this Report.—R. V. H.

December 31, 1918.

NOTE BY I. C. WHITE, STATE GEOLOGIST, ON BORE HOLE RECORDS THROUGH THE NEW RIVER GROUP RECEIVED FROM THE LOW MOOR IRON COMPANY OF VIRGINIA.

After the forms for this report had been closed, the State Geologist received through the courtesy of F. U. Humbert, General Manager of the Low Moor Iron Company of Virginia, Low Moor, Virginia, five very valuable records of core borings put down in the vicinity of Fayetteville. These borings, beginning as they do above the great Nuttall Sandstone cliffs which overlie the famous Sewell Coal by 300 to 400 feet at top, are of especial value in giving accurate measurements between important coal horizons of the New River Group, and one of them; viz, No. 3, passes entirely through the Pottsville into the top of the Mauch Chunk or Mississippian beds. The accompanying map, reproduced from a portion of the Fayetteville quadrangle by R. C. Tucker, of the Survey Staff, gives the location of each of the five bore holes as indicated by Mr. Humbert of the Low Moor Iron Company of Virginia. In these records given below, Mr. Tucker is also responsible for the identifications of all the strata except the Sewell Coal, and he also determined the approximate tidal elevation of this important coal in the several bore holes.

Record of Bore Hole No. 1; Location, one-half mile east from Fayetteville on House Branch of Wolf Creek; Elevation, top of Bore Hole, approximately 1694′ A. T.:

			Thickness		Total	
			Ft.	In.	Ft.	In.
Gravel			7	0	7	0
Sandstone, soft ..	3′ 0″	Upper				
Sandstone, gray ..	3 0	and				
Sandstone, hard, white	27 0	Lower Nuttall	106	0	113	0
Sandstone, white	73 0					

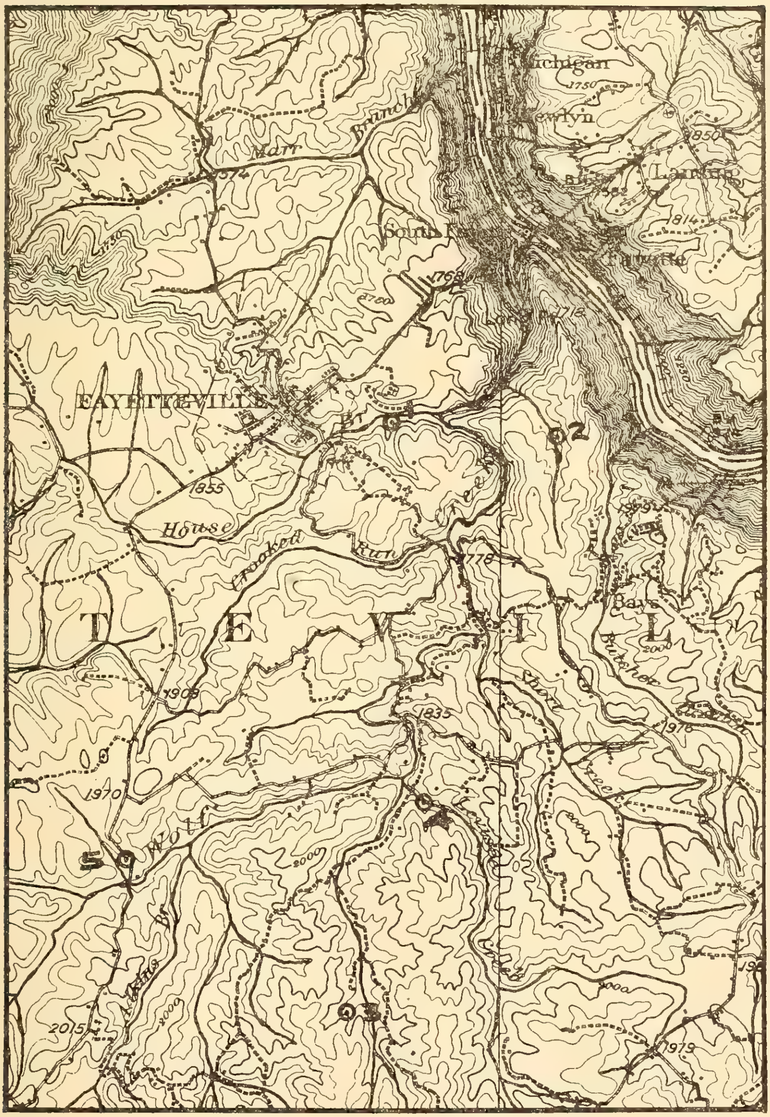

Figure 2(a).—Map showing location of bore holes of Low Moor Iron Company of Virginia.

		Thickness Ft.	Thickness In.	Total Ft.	Total In.		
Shale		41	6	154	6		
Coal, Lower Iaeger		0	6	155	0	155′	0″
Shale, sandy		9	0	164	0		
Sandstone, white, very hard ....23′ 0″ Sandstone, white 27 0	**Harvey Conglomerate**	50	0	214	0		
Shale		29	0	243	0		
Sandstone, white ......17′ 0″ Shale .... 6 0 Sandstone, white 18 0	**Guyandot**	41	0	284	0		
Coal, Sewell "B"		1	0	285	0	130′	0″
Shale		7	0	292	0		
Shale, sandy		10	0	302	0		
Sandstone, 6′ 0″ Sandstone, dark .... 4 0 Shale ....21 0 Sandstone, white 7 0	**Lower Guyandot**	38	0	340	0		
Shale, sandy		24	6	364	6		
Slate, gray, **Hartridge**		1	0	365	6		
Coal ....3′ 6″ Bone 0 4	**Sewell**, (tidal elevation, 1325′)	3	10	369	4	84′	4″
Slate, rotten		0	9	370	1		
Slate		0	7	370	8		
Rotten slate, **coal** spars		0	10	371	6		
Slate to bottom		3	6	375	0		

Record of Bore Hole No. 2; Located about one mile slightly south of east from Bore Hole No. 1, on another branch of Wolf Creek; Top of Boring, approximately 1812′ A. T.:

		Thickness. Ft.	Thickness. In.	Total Ft.	Total In.
Quicksand and boulders		6	0	6	0
Boulders		2	0	8	0
Sand and boulders		2	0	10	0
Boulders		1	0	11	0
Sand and boulders		2	0	13	0
Sandstone, crystallized ....39′ 0″ Sandstone, crystallized, white .24 0 Sandstone, crystallized ....26 0 Sandstone, crystallized, white .25 0 Sandstone, white, hard 10 0	**Upper and Lower Nuttall**	124	0	137	0

	Thickness Ft.	Thickness In.	Total Ft.	Total In.		
Shale, sandy....26′ 0″						
Shale 21 0	58	0	195	0		
Shale, sandy....11 0						
Sandstone, **Harvey Conglomerate**	13	0	208	0		
Shale, sandy.....30′ 0″						
Shale 8 0	87	0	295	0		
Shale, sandy.....29 0						
Shale 20 0						
Sandstone	11	0	306	0		
Shale, sandy	4	0	310	0		
Sandstone, **Lower Guyandot**	57	0	367	0		
Shale, **Hartridge**	16	9	383	9		
Coal, Sewell, (1425′ A. T.)	3	0	386	9	386′	9″
Shale	7	3	394	0		
Shale, sandy	36	0	424	0		
Sandstone, **Welch**	3	0	427	0		
Shale	33	6	460	6		
Sandstone ...... 3′ 6″						
Shale 7 0						
Sandstone ......38 0 **Upper**						
Conglomerate ... 2 0 **Raleigh**	83	6	544	0		
Shale 11 0						
Sandstone 21 0						
Conglomerate ... 1 0						
Shale	5	4	549	4		
Coal, Little Raleigh	0	8	550	0	163′	3″
Shale	11	0	561	0		
Sandstone	3	0	564	0		
Shale	25	0	589	0		
Coal, bony, Beckley	1	0	590	0	40′	0″
Shale and clay	2	0	592	0		
Sandstone, crystallized, **Quinnimont**	45	0	637	0		
Shale	21	6	658	6		
Coal, Fire Creek	1	2	659	8	69′	8″
Sandstone	3	4	663	0		
Shale	27	0	690	0		
Sandstone, **Pineville**	73	0	763	0		
Shale	7	0	770	0		
Sandstone, **Flattop Mountain**	44	0	814	0		
Shale	2	0	816	0		
Shale, hard	19	0	835	0		
Shale to bottom	10	0	845	0		

Record of Bore Hole No. 3; Located about 3⅛ miles due south from Bore Hole No. 1, on the plateau above a branch of Wolf Creek; Elevation of top of boring, approximately 1927′ A. T.:

				Thickness		Total		
				Ft.	In.	Ft.	In.	
Clay				13	1	13	1	
Sandstone, crystallized, charred	0	5″	Lower Nuttall	74	11	88	0	
Sandstone, crystallized	10	6						
Sandstone	32	0						
Sandstone crystallized	21	0						
Shale, dark	1	6						
Sandstone, crystallized	9	6						
Shale, slaty	24	0″	....	75	0	163	0	
Shale, dark	8	0						
Shale, sandy	30	0						
Shale	13	0						
Coal, Lower Iaeger				0	10	163	10	163′ 10″
Sandstone, Harvey Conglomerate				18	2	182	0	
Shale	6′	0″	....	109	0	291	0	
Shale and sandstone partings	38	0						
Shale, broken	33	0						
Shale and sandstone partings	32	0						
Sandstone, crystallized	6′	0″	Guyandot	19	0	310	0	
Sandstone	13	0						
Shale				22	0	332	0	
Sandstone	22′	0″	Lower Guyandot	31	10	363	10	
Shale and sandstone partings	1	6						
Sandstone	8	4						
Shale, sandy, Hartridge				4	10	368	8	
Coal, Sewell, (1555′ A. T.)				3	4	372	0	208′ 2″
Shale				8	10	380	10	
Sandstone, Welch				40	0	420	10	
Shale				9	6	430	4	
Sandstone				1	6	431	10	
Shale, sandy				8	6	440	4	
Shale, dark				9	0	449	4	
Shale and sandstone partings				2	0	451	4	
Sandstone	45′	0″	Upper and Lower Raleigh	132	6	583	10	
Sandstone, crystallized	26	0						
Conglomerate	1	0						
Sandstone, crystallized	33	0						
Conglomerate	0	6						
Sandstone, crystallized	12	6						
Shale, gray	2	0						
Sandstone, crystallized	2	0						
Sandstone	10	6						

		Thickness Ft.	In.	Total Ft.	In.		
Shale		9	6	593	4		
Coal, Beckley		2	0	595	4	223′	4″
Sandstone ...... 5′ 0″	**Quinnimont**	59	0	654	4		
Shale and sandstone partings . 54 0							
Coal, bony, Fire Creek		0	2	654	6	59′	2″
Shale, dark		2	10	657	4		
Sandstone		6	0	663	4		
Shale and sandstone partings . . 13′ 0″	....	64	0	727	4		
Shale, gray 16 0							
Shale, sandy. . . . 27 0							
Shale, dark 8 0							
Sandstone ...... 4′ 0″	**Pineville**	27	6	754	10		
Sandstone, crystallized 23 6							
Shale, dark		6	6	761	4		
Sandstone, crystallized ...... 1′ 0″	**Flattop Mountain**	46	0	807	4		
Conglomerate ... 2 0							
Sandstone 18 0							
Sandstone, crystallized 19 0							
Sandstone 6 0							
Shale		7	0	814	4		
Shale and sandstone partings		1	0	815	4		
Sandstone		3	0	818	4		
Shale and sandstone partings		3	0	821	4		
Shale, dark		10	0	831	4		
Shale and sandstone partings		5	0	836	4		
Shale		13	0	849	4		
Sandstone ...... 1′ 0″	**Pierpont**	35	0	884	4		
Sandstone, crystallized 16 0							
Shale 2 0							
Sandstone, crystallized 1 0							
Sandstone 1 0							
Conglomerate ... 3 0							
Sandstone 11 0							
Shale		2	0	886	4		
Sandstone		7	0	893	4		
Shale		1	0	894	4		
Sandstone ...... 39′ 0″	**Eckman**	43	0	937	4		
Conglomerate ... 3 0							
Sandstone 1 0							
Shale, sandy, sandstone partings		11	0	948	4		
Sandstone		1	0	949	4		
Shale, sandy		1	0	950	4		
Sandstone		1	0	951	4		
Shale with **coal** partings		14	0	965	4		
Sandstone, **Upper Pocahontas**		62	0	1027	4		

			Thickness Ft.	In.	Total Ft.	In.
Shale, sandy	54′	0″	206	0	1233	4
Shale, dark	19	0				
Shale, sandy	19	0				
Shale	35	0				
Shale, sandy	14	0				
Shale	32	0				
Shale, sandy	33	0				
Sandstone	9′	0″	115	0	1348	4
Shale	16	0				
Sandstone	16	0				
Sandstone, crystallized	9	0				
Sandstone	5	0				
Shale	2	0				
Conglomerate	1	6				
Sandstone	9	6				
Sandstone, crystallized, base of Pottsville	47	0				
Shale, red, Mauch Chunk			19	0	1367	4
Sandstone			8	0	1375	4

This wonderful record begins approximately 50 feet below the top of the Upper Nuttall Sandstone, and thus gives (1348′ + 50′) 1398 feet for the thickness of the New River and Pocahontas Groups of the Pottsville Series on New River, which is only 2 feet less than the barometric measurement (1400′) obtained by the writer in 1884 and published in Bulletin 65, U. S. Geological Survey, page 197. It will also be noted in this long section that the Beckley Coal lies 221 feet below the Sewell, and the only representative of the Fire Creek bed is but 2 inches thick and comes 59 feet below the Beckley seam, while no coal whatever occurs in the 694 feet of New River and Pocahontas measures below down to the top of the Mauch Chunk, the thin coals of the Pocahontas Group found on Piney Creek in southern Raleigh County having thinned away northward just as they do on Tug River in McDowell County.

Record of Bore Hole No. 4; Located near the mouth of Levisee Creek, 1⅛ miles northeastward from Bore Hole No. 3; Elevation Top of Bore Hole, approximately 1818′ A. T.:

	Thickness		Total			
	Ft.	In.	Ft.	In.		
Boulders	10	0	10	0		
Sandstone 4′ 0″ Sandstone, crystallized 45 0 **Lower Nuttall**	49	0	59	0		
Shale, sandy	27	0	76	0		
Shale	21	0	87	0		
Sandstone	6	0	93	0		
Shale	2	4	95	4		
Coal, Lower Iaeger	0	8	96	0	96′	0″
Sandstone, **Harvey Conglomerate**	20	0	116	0		
Shale, sandy 8′ 0″ Shale 9 0 Shale with sandstone partings 36 0 Shale, sandy 17 0 Shale 10 0	70	0	186	0		
Sandstone, **Guyandot**	33	0	219	0		
Shale	6	6	225	6		
Coal, Sewell "B"	1	0	226	6	130′	0″
Shale	6	6	233	0		
Sandstone	18	0	251	0		
Shale	14	0	265	0		
Sandstone, **Lower Guyandot**	40	0	305	0		
Shale, **Hartridge**	5	0	310	0		
Coal, Sewell (1505′ A. T.)	3	5	313	5	86′	11″
Shale	3	7	317	0		
Sandstone, **Welch**	35	0	352	0		
Shale	43	0	395	0		
Sandstone, **Upper Raleigh**	76	0	471	0		
Shale	6	0	477	0		
Shale, bony coal, Little Raleigh	1	0	478	0	164′	7″
Shale	12	0	490	0		
Sandstone	6	0	496	0		
Shale 36′ 0″ Shale, sandy 10 0 Shale 22 0	68	0	564	0		
Sandstone	4	0	568	0		
Shale 50′ 0″ Shale, sandstone partings 29 0 Shale, sandy 13 0	92	0	660	0		
Sandstone, shale partings 17′ 0″ Sandstone 43 0 **Pineville**	60	0	720	0		
Shale	4	0	724	0		
Coal, No. 8 Poahontas	0	10	724	10	246′	10″
Shale	2	2	727	0		
Sandstone, **Flattop Mountain**	14	0	741	0		
Shale, sandy	19	0	760	0		
Sandstone	4	0	764	0		
Shale, sandstone partings	18	0	782	0		
Shale	3	0	785	0		
Clay shale	2	0	787	0		

At this location one of the Pocahontas coals which Mr. Tucker correlates with Pocahontas No. 8 makes its appearance in the section at 411 feet below the Sewell seam.

Record of Bore Hole No. 5; Located near Wolf Creek, 1½ miles southwest from Bore Hole No. 4; Elevation, approximately 1786′ A. T.:

		Thickness		Total			
		Ft.	In.	Ft.	In.		
Clay and sand		5	0	5	0		
Sandstone, crystallized ....44′ 0″	Lower Nuttall	54	0	59	0		
Shale 5 0							
Sandstone, crystallized 3 0							
Conglomerate ... 2 0							
Shale, sandy		35	0	94	0		
Shale		40	3	134	3		
Coal, Lower Iaeger		0	9	135	0	135′	0″
Sandstone, **Harvey Conglomerate**		6	0	141	0		
Shale with sandstone partings		74	0	215	0		
Shale		5	3	220	3		
Coal, Castle		1	4	221	7	86′	7″
Shale with sandstone partings.38′ 5″	Guyandot	65	5	287	0		
Sandstone 4 0							
Shale with sandstone partings.23 0							
Shale		20	0	307	0		
Sandstone, **Lower Guyandot**		39	0	346	0		
Shale, sandy, **Hartridge**		12	0	358	0		
Coal, Sewell (1425′ A. T.)		3	8	361	8	140′	1″
Shale		6	4	368	0		

This boring No. 5 found the Sewell Coal at the same elevation (1425′ A. T.) as it was in boring No. 2, about 3 miles to the northeast, and hence is on the line of strike from the latter.

ERRATA.

Page 124, line 5 from top, for “Big Injun. .5,” read “Big Injun. .55.”

Page 145, line 26 from top, for “(No. 43 on Map II)”, read “(No 42 on Map II).”

Page 145, line 31 from top, for “(No. 76 on Map II)”, read “(No. 75 on Map II).”

Page 151, line 7 from top, in interval column, for “34.3″”, read “34.3′.”

Page 164, line 4 from top, for “No. 2 Gas”, read “Powellton.”

Page 172, line 13 from top, for “genedal”, read “general.”

Page 191, line 10 from top, for “4 3″”, read “4′ 4″.”

Page 193, line 3 from top, for “erronously”, read “erroneously.”

Page 200, under line 19 from bottom, insert “Feet. Feet.”

Page 203, line 15 from top, for “Sadnstone”, read “Sandstone.”

Page 243, line 4 from top, for “Wniifrede” read “Winifrede.”

Page 248, line 17 from bottom, for “UPPER CEDAR SANDSTONE”, read “UPPER CEDAR GROVE SANDSTONE.”

Page 271, line 4 from top, for “Lowe”, read “Lower.”

Page 288, line 6 from bottom, for “Tayloyr”, read “Taylor.”

Page 360, top line, for “blue”, read “black.”

Page 414, line 27 from top, for “elevation, 2050.5′ L.”, read “elevation, 2020.5′ L.”

Page 455, line 12 from bottom, for “342 2”, read “342 3.”

Page 458, line 10 from top, for “medium-softt”, read “medium-soft.”

Page 464, line 8 from bottom, for “black”, read “block.”

Page 466, line 6 from bottom, for “E. 60° E.”, read “S. 60° E.”

Page 487, line 2 from bottom, under column headed “Square Miles”, for “0.50”, read “0.59.”

Page 542, line 5 from top, for “3.2”, read “3.3.”

Page 544, line 20 from bottom, for “3.46”, read “3.45.”

Page 546, line 24 from top, for “receivet”, read “received.”

Page 590, line 4 from top, for “Companw”, read “Company.”

Page 592, line 3 from top, for “6.8”, read “6.4.”

Page 605, line 18 from bottom, for “buts”, read “butts.”

Page 622, line 15 from bottom, for “Distict”, read “District.”

Page 759, line 30 from top, for “Combustble”, read “Combustible.”

Page 806, line 14 from bottom, for “73-1”, read “73.1.”

Page 847, line 7 from top, for “2″ 8½″”, read “2′ 8½″.”

Page 873, line 10 from bottom, for “A. R.”, read “A. D.”

Page 903, line 5 from bottom, for “Sewells”, read “Sewalls.”

PART I.

History and Physiography.

CHAPTER I.

HISTORICAL AND INDUSTRIAL DEVELOPMENT.

LOCATION.

Fayette County, the area described in this Report, is situated just south of the central portion of West Virginia, being included between the parallels of 37° 49′ and 38° 17′ North Latitude, and 81° 23′ and 80° 45′ West Longitude from Greenwich. It lies entirely within the watershed of the Great Kanawha River whose drainage empties into the Ohio. It is bounded on the north by Kanawha, Clay, and Nicholas Counties; on the east by Nicholas and Greenbrier; on the south by Summers and Raleigh; and on the west by Raleigh and Kanawha, its geographical position being shown in detail on Figures 1 and 2, and on Maps I and II, accompanying this Report in a separate cover.

TRANSPORTATION.

Water Ways.

Great Kanawha River.—This stream, formed by the confluence of the Gauley and New Rivers at Gauley Bridge, Fayette County, flows westerly across the latter area and has long been used in the transportation of logs, cross-ties, salt, and coal. The U. S. Government early appreciated its value for this purpose and constructed thereon a series of ten locks and dams between Point Pleasant and Montgomery, Dam No. 11 being located near its mouth and No. 2, one mile below Montgomery in the edge of Kanawha County, while the proposed location of No. 1 is just below the mouth of Loop Creek between Deepwater and Mount Carbon in Fayette. Facing page 32 of the Kanawha County Report of the State Geological Survey, is a Map and Profile of the Kanawha River prepared by C. E. Krebs showing the elements and accurate locations of the ten locks and dams already completed. These give slack-water navigation from Mount Carbon to the Ohio River, a distance of 90 miles. The following table, taken from page 35 of the last-mentioned Report, exhibits interesting data concerning these locks and dams:

Data Concerning Locks and Dams in Kanawha River, W. Va.

(Furnished the Survey by Thos. E. Jeffers, U. S. Engineer, Charleston, W. Va.)

LOCKS									DAMS										
							Tide Reference.						Length of Wickets.		Tide Reference				
No. of Lock.	Miles from Mouth.	1879 Low Water	Clear Width	Available Length.	Length Over All.	Length between Quoins.	Miter Sill.	Top of Wall.	Style.	Length of Pass.	Length of Weir.	Height of Pass Trestle.	Pass.	Weir	Pass Sill.	Weir Sill.	Upper Pool.	Normal Lifht.	When Finished.
			Feet.	Feet.	Feet.	Feet.				Feet.	Feet.	Ft. In.	Ft. In.	Ft. In.				Feet.	
2.	84½	585.46	50	271	377	308	578.75	609.75	Fixed	...	...	.. ...	.. ...	.. ...	......	......	597.75	10.33	1887
3.	79½	571.32	50	272	381	312	566.75	596.75	"	...	...	.. ...	.. ...	.. ...	......	......	587.42	13.67	1882
4.	73¼	564.44	50	274	365	300	559.75	579.75	Movable	248	210	16 2¼	13 9	6 3½	561	567.75	573.75	7.25	1880
5.	67¼	556.22	50	274	365	300	552.50	572.50	"	250	265.5	17 ½	13 10	5 3	553.50	561.50	566.50	7.50	1880
6.	54	548.64	55	313	410.5	342	543.75	565.50	"	248	310	16 8½	13 5½	7 7	546.50	552	559	8.50	1886
7.	44	539.63	55	313	411	342	535.50	555.50	"	248	316	16 9¾	14 ⅛	9 2 5-32	537.50	542	550.50	8.25	1893
8.	36	531.27	55	313	411	342	526	547.25	"	248	292	16 9¾	14 ⅛	9 2 5-32	529.25	533.75	542.25	8	1893
9.	25¼	523.64	55	313	411	342	520.50	539.50	"	248	284	16 9¾	14 ⅛	9 2 5-32	521.25	525.75	534.25	6.25	1898
10.	19	517.41	55	313	411	342	514	533	"	248	284	16 9¾	14 ⅛	9 2 5-32	515	519.50	528	7	1898
11.	1¾	510.08	55	313	411	342	504	526	"	304	364	16.9¾	14 ⅛	9 2 5-32	508	512.50	521	10.92	1898

NOTE: Upper miter sill: Lock No. 2=589.75; Lock No. 3=576.75. Top of wall at head of Lock No. 3=601.25. Elevations are 3.855 lower than U. S. Geological Survey.

The following table, taken from page 36 of the same Report shows the number of days that navigation was suspended on the Kanawha River on account of ice since the year 1875, as recorded in the office of Thos. E. Jeffers, United States Engineer, Charleston, W. Va.:

	Number of days		Number of days
1875	18	1897	14
1876	23	1898	13
1877	13	1899	20
1878	7	1900	23
1879	17	1901	4
1880	3	1902	21
1881	7	1903	8
1882	14	1904	65
1883	29	1905	4
1887	2	1906	4
1888	8	1907	12
1889	0	1908	7
1890	0	1909	0
1891	0	1910	16
1892	6	1911	15
1893	30	1912	44
1894	0		
1895	5		
1896	13		

Total for 38 years 465. Average per year 12.3.

Gauley River and **New River**, which unite to form the Kanawha, have several miles of their courses in Fayette County, but are too rapid for steamboat navigation. Like the Kanawha, they have long been used as a means of transporting cross-ties and timber in log form.

The five following tables, republished from pages 37, 38, 39, 40, and 41 of the Kanawha County Report, give the **rainfall** at Charleston, and the **maximum, minimum, and average stages** of the Kanawha River at the same place:

Rainfall at Charleston, West Virginia for 28 Years, 1885-1912, in Inches.

	Jan.	Feb.	Mar	Apr.	May	Jun.	Jul.	Aug	Sep.	Oct.	Nov	Dec.	Total
1885 ...	5.12	2.12	1.57	2.84	2.38	2.49	4.13	4.61	1.25	5.30	2.08	1.61	35.50
1886 ...	2.86	2.49	4.10	3.25	5.51	6.90	2.38	3.57	5.13	0.91	4.32	2.78	44.20
1887 ...	1.88	8.10	2.69	4.60	2.13	3.31	2.20	4.96	2.96	0.61	1.16	1.73	36.33
1888 ...	3.55	3.25	4.28	1.97	3.72	1.40	3.88	4.64	6.29	6.30	2.69	1.67	43.64
1889 ...	3.53	2.13	1.97	2.23	6.49	7.19	6.31	1.87	5.69	3.12	5.37	1.60	47.50
1890 ...	3.55	6.86	8.94	4.48	6.94	2.86	2.93	9.05	3.08	3.14	2.00	5.40	59.23
1891 ...	4.38	5.47	4.55	2.31	4.84	7.74	3.79	6.16	1.23	1.94	3.25	2.83	48.49
1892 ...	3.62	2.08	4.52	4.99	4.96	2.74	4.08	4.27	1.59	0.59	3.75	3.59	40.78
1893 ...	2.56	4.43	1.60	3.54	2.95	4.29	4.08	4.27	1.59	0.59	3.75	3.59	40.49
1894 ...	2.32	5.00	2.09	3.16	3.88	2.82	0.42	1.56	4.00	1.16	2.50	3.91	32.82
1895 ...	5.15	0.73	4.24	2.60	2.08	2.04	4.43	5.68	1.16	1.20	1.85	2.62	33.78
1896 ...	1.00	4.01	7.10	2.67	4.24	4.81	5.11	4.74	3.84	2.62	3.68	1.68	45.50
1897 ...	1.20	5.62	3.13	2.74	4.63	6.34	4.00	3.10	0.48	0.00	3.79	4.10	39.13
1898 ...	6.15	2.23	7.20	2.16	3.17	3.10	5.45	7.53	3.72	4.30	2.66	2.45	50.09
1899 ...	7.34	4.20	8.49	1.49	4.05	5.40	5.39	4.54	3.40	0.86	1.75	2.06	48.97
1900 ...	1.31	3.35	3.15	0.96	2.78	7.09	3.80	2.88	0.66	1.80	6.58	1.89	36.25
1901 ...	1.49	0.72	2.91	6.47	5.11	6.86	1.94	5.23	3.43	0.38	1.50	7.28	43.32
1902 ...	4.25	4.04	3.66	1.86	1.96	6.52	4.90	1.30	3.04	1.74	3.56	5.69	42.52
1903 ...	1.82	7.99	4.10	5.46	1.84	3.48	2.52	1.44	0.28	1.70	2.16	2.19	34.98
1904 ...	2.19	2.63	3.54	4.08	2.72	2.69	3.28	3.45	1.51	1.65	0.45	2.65	30.84
1905 ...	3.28	2.94	4.81	3.33	5.69	5.05	4.56	3.82	1.06	5.31	2.17	2.96	44.98
1906 ...	3.31	1.65	5.37	1.96	2.25	5.76	5.59	2.51	3.62	1.60	1.97	4.77	40.36
1907 ...	5.02	4.31	3.72	3.59	3.66	6.27	5.31	7.12	2.59	3.10	3.91	2.37	50.97
1908 ...	2.16	3.71	7.10	7.15	4.50	2.50	4.25	1.94	0.40	1.24	1.53	3.29	39.77
1909 ...	2.74	4.04	4.98	4.88	4.42	5.88	5.60	3.66	4.10	1.83	2.39	1.27	45.79
1910 ...	5.05	3.09	0.66	3.37	4.93	8.61	5.18	0.78	4.88	1.62	2.13	3.06	44.36
1911 ...	5.32	2.51	3.62	4.53	1.37	3.13	1.84	7.45	3.15	5.15	3.94	3.25	45.26
1912 ...	2.56	3.03	5.52	4.28	2.76	3.09	6.15	5.49	2.11	2.70	1.36	2.91	40.26
Average	3.38	3.67	4.27	3.46	3.78	4.66	4.05	4.20	2.13	2.16	2.79	3.04	42.33

Maximum River Stages, Charleston, W. Va., July, 1873, to Dec. 31, 1912.

	Jan.	Feb.	Mar	Apr.	May	Jun.	Jul.	Aug	Sep.	Oct.	Nov	Dec.
1873	....	....	....	....	....	....	5.1	5.8	4.4	6.6	14.9	10.1
1874	16.3	10.0	11.3	31.6	13.9	4.1	12.0	7.9	5.6	9.4	8.8	10.7
1875	8.6	32.5	20.7	19.4	10.7	9.0	23.3	31.3	5.5	5.4	11.5	13.0
1876	14.7	15.3	14.9	13.0	9.5	13.1	7.2	13.0	20.0	5.9	10.5	5.7
1877	33.3	6.7	13.0	12.4	12.8	6.4	6.0	3.4	4.9	7.5	34.3	9.5
1878	19.8	17.1	16.0	11.3	15.0	6.8	10.9	16.3	39.2	6.7	21.1	24.9
1879	36.7	11.1	11.1	8.4	7.9	6.2	3.2	5.8	3.7	6.4	3.5	18.7
1880	6.1	26.3	21.2	23.8	15.8	13.8	4.3	4.8	7.1	4.2	6.1	12.9
1881	19.0	18.2	8.9	12.3	6.3	6.7	4.6	2.4	11.6	2.3	7.3	16.0
1882	24.4	20.8	18.5	8.5	18.8	8.6	10.8	9.5	16.2	5.4	4.4	8.5
1883	18.2	25.9	25.4	25.7	6.1	7.6	6.1	2.8	6.3	6.0	6.8	17.9
1884	13.9	28.4	25.8	10.1	8.0	13.9	8.0	5.6	2.5	0.7	3.8	8.8
1885	17.4	9.7	8.3	12.1	12.8	11.2	4.9	4.2	1.5	12.8	12.4	14.3
1886	28.0	14.5	22.0	38.8	22.3	12.7	12.3	5.9	4.1	5.0	12.8	12.3
1887	20.0	23.7	14.5	22.7	14.4	8.4	5.0	5.5	4.9	6.0	4.8	5.0
1888	7.4	13.2	15.0	9.5	8.1	8.4	6.6	5.1	16.4	18.6	11.9	10.9
1889	17.7	22.3	8.9	8.4	19.2	28.5	14.4	13.2	12.0	12.0	14.1	7.7
1890	11.6	26.0	31.0	14.4	17.6	5.9	3.5	6.4	5.7	13.1	6.8	7.8
1891	26.9	24.1	22.0	19.0	12.0	14.1	5.0	8.0	5.3	2.7	7.7	11.5
1892	28.8	8.0	16.0	26.3	12.7	7.9	4.4	4.4	4.3	2.2	5.1	8.2
1893	11.3	11.2	9.8	12.2	27.0	8.2	5.1	3.3	11.4	11.6	5.8	6.5
1894	7.0	19.9	10.0	6.4	6.9	5.5	3.4	2.9	2.1	2.2	3.4	7.2
1895	18.4	6.0	18.3	23.9	9.9	4.8	7.3	3.6	3.6	1.1	2.9	6.2
1896	8.5	12.0	24.5	23.5	9.2	9.2	18.9	8.0	3.2	10.8	14.1	11.4
1897	6.2	41.1	14.2	9.1	20.6	12.5	14.6	5.0	2.2	4.4	3.1	8.4
1898	13.1	6.5	19.4	17.2	14.7	6.6	9.8	31.0	9.0	20.0	11.3	8.5
1899	24.6	19.4	40.2	10.0	16.4	10.0	7.9	7.4	4.9	2.7	7.2	9.8
1900	11.0	16.0	20.5	8.5	7.0	10.0	7.4	5.4	3.6	17.8	30.9	17.2
1901	17.0	8.4	12.0	25.8	35.9	21.0	8.3	15.7	7.0	6.5	....	35.1
1902	20.8	21.6	33.0	14.0	10.4	8.3	7.6	7.0	7.0	7.1	7.5	12.1
1903	17.7	24.0	24.0	12.9	9.3	8.1	7.0	7.7	7.2	7.0	7.0	6.6
1904	9.4	8.0	11.4	14.3	9.6	7.8	7.4	7.3	6.8	6.9	7.2	7.3
1905	11.7	7.6	25.3	8.6	27.5	7.5	20.2	7.8	7.4	11.2	7.3	10.6
1906	27.6	7.6	11.6	13.0	7.9	7.8	7.4	11.2	9.0	19.8	22.5	17.2
1907	29.3	10.5	20.9	13.8	7.9	31.3	8.4	13.4	12.0	8.5	12.3	14.4
1908	21.9	27.0	18.2	29.9	13.0	7.5	9.0	9.5	9.1	7.4	7.1	7.7
1909	11.8	11.2	12.0	12.9	15.8	8.9	11.2	7.4	7.7	7.8	7.8	7.9
1910	13.4	12.8	10.3	9.0	9.3	21.1	8.9	7.3	7.7	7.8	7.7	7.6
1911	26.2	18.2	10.7	16.0	7.6	7.4	7.7	7.4	7.9	8.4	8.7	10.2
1912	8.0	16.1	15.5	13.0	15.5	9.0	8.7	8.0	9.0	7.9	8.8	8.3

Minimum River Stages at Charleston, W. Va., from July, 1873, to December 31, 1912.

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
1873	....	....	....	....	....	....	2.9	2.9	2.0	1.9	3.1	3.5
1874	3.4	5.4	4.6	6.3	3.6	2.3	1.9	2.4	1.3	2.3	2.0	4.5
1875	4.2	4.5	7.7	6.2	3.6	3.5	5.9	4.1	2.3	2.9	2.8	5.4
1876	4.2	6.1	5.0	5.5	5.1	3.3	2.9	3.2	3.5	2.8	2.7	4.3
1877	2.8	3.8	3.5	6.5	4.4	3.8	3.7	1.9	1.6	1.8	2.9	4.7
1878	4.3	6.2	5.5	5.6	6.0	4.4	3.4	4.3	3.1	3.0	5.2	5.4
1879	3.5	5.8	6.1	5.0	3.8	2.2	1.5	2.9	1.4	1.1	1.9	3.2
1880	4.3	4.0	6.3	4.9	3.3	3.1	2.7	1.9	1.3	1.6	2.4	2.9
1881	2.0	6.0	6.0	6.1	2.6	2.2	1.2	0.1	0.4	0.7	2.8	4.4
1882	5.8	6.5	6.1	4.5	5.8	4.1	2.8	2.3	4.0	2.7	2.5	2.6
1883	3.7	6.2	5.5	7.8	4.0	3.2	2.1	0.5	0.4	2.3	2.8	3.8
1884	3.8	6.6	8.0	5.5	5.4	3.5	2.5	1.9	1.0	0.3	0.7	1.5
1885	4.7	4.3	4.2	4.8	3.6	3.4	3.0	1.6	0.1	0.1	4.6	4.9
1886	4.5	4.8	4.8	4.4	6.0	5.0	3.6	3.1	1.9	1.9	4.8	4.0
1887	5.4	7.5	4.9	4.9	4.4	4.0	4.3	4.7	4.5	4.5	4.5	4.0
1888	3.3	4.4	5.0	4.5	4.2	4.0	3.6	4.4	4.2	5.0	4.8	4.5
1889	6.4	4.8	5.2	4.5	4.5	5.0	5.0	4.4	4.9	3.8	5.7	4.7
1890	5.8	7.9	6.3	6.5	6.1	3.2	2.0	2.4	2.4	4.6	4.3	3.6
1891	6.3	8.3	7.2	5.0	3.8	3.7	3.6	2.9	2.2	2.0	2.0	2.9
1892	5.0	4.6	5.8	5.9	5.0	3.7	2.8	1.7	1.3	1.4	1.4	2.8
1893	2.5	6.0	4.5	5.0	4.9	3.6	2.0	1.2	3.0	2.9	2.8	3.4
1894	4.9	5.1	4.9	3.9	3.1	2.2	1.4	1.0	0.1	1.0	2.1	2.1
1895	2.7	1.0	6.4	4.7	4.7	1.9	1.8	2.2	1.1	0.9	1.0	1.8
1896	1.0	3.9	4.6	4.5	3.0	2.5	2.6	2.4	2.1	1.9	2.9	3.2
1897	2.9	3.5	6.2	4.3	3.5	3.6	3.1	2.0	0.7	0.6	1.3	1.8
1898	4.1	3.0	3.8	5.2	3.8	1.4	1.7	3.3	1.2	1.2	4.8	3.8
1899	5.5	4.9	7.1	5.0	3.0	3.9	3.6	1.9	1.9	1.6	3.2	2.4
1900	0.9	2.0	5.7	4.7	4.6	4.5	4.0	1.8	1.5	5.1	7.6	4.8
1901	4.6	3.5	5.1	6.3	5.2	6.0	4.5	5.0	4.7	4.2	....	4.1
1902	4.1	4.2	5.6	5.2	5.1	5.0	5.6	6.4	5.0	5.3	6.1	4.0
1903	5.0	6.5	5.7	6.8	4.1	4.6	4.8	6.5	6.5	6.6	6.5	0.1
1904	2.5	3.9	5.6	4.8	4.8	4.8	4.8	6.5	6.3	6.1	6.8	7.0
1905	1.5	1.7	6.6	5.8	4.4	4.9	4.7	7.1	6.8	6.8	7.0	4.9
1906	4.9	3.9	5.1	5.1	4.4	6.2	6.3	5.9	4.6	4.6	5.1	4.8
1907	5.2	5.2	4.8	6.4	5.3	5.0	5.4	4.0	5.2	4.3	4.4	5.1
1908	5.8	4.5	6.2	6.0	5.8	4.4	6.4	4.4	5.8	4.2	4.1	5.9
1909	5.3	3.8	5.3	5.1	5.3	5.4	4.6	6.8	6.8	6.8	6.8	1.8
1910	1.6	4.8	5.3	6.5	5.2	5.3	5.1	6.6	5.0	6.9	6.9	2.9
1911	5.4	5.0	5.8	6.6	5.0	5.9	6.5	6.5	6.4	5.1	5.3	7.0
1912	3.0	4.2	5.3	5.7	6.6	5.1	6.5	6.8	6.9	6.8	6.3	2.8

NOTE.—When the minimum reading is less than 4.5, it indicates the wickets at Lock No. 6 are down.

Average Gauge Reading of Kanawha River Each Month from July 1, 1873, to December 1, 1912, taken at Charleston, W. Va., by the U. S. Engineers.

YEAR	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1873	.....	.....	.....	.....	.....	.....	4.27	3.96	2.90	3.16	5.51	6.19
1874	7.81	6.34	6.38	13.67	5.62	3.28	3.71	4.19	2.44	3.82	3.56	6.50
1875	6.27	8.24	10.60	8.50	5.69	5.91	10.57	9.11	3.34	3.63	6.61	7.22
1876	7.26	7.95	7.95	7.35	6.85	5.20	4.28	5.47	8.44	3.63	4.05	4.61
1877	11.54	4.71	7.04	7.82	7.23	4.94	4.26	2.38	2.49	3.60	7.69	5.88
1878	8.91	8.79	7.73	7.14	8.83	5.52	4.63	6.73	7.59	3.97	7.71	9.30
1879	11.38	7.71	8.13	6.27	5.48	3.62	2.43	3.54	2.78	2.35	2.47	7.41
1880	5.32	7.94	10.58	7.69	5.53	4.96	3.36	3.04	3.21	2.25	4.11	5.99
1881	7.64	9.56	7.27	8.09	4.28	3.88	2.34	1.19	2.14	1.35	4.49	7.36
1882	12.29	11.55	8.75	6.24	8.50	5.78	5.52	4.67	6.54	3.29	3.12	5.14
1883	7.62	11.27	7.06	12.07	4.88	5.05	3.75	1.72	1.98	3.77	6.61	6.05
1884	7.29	16.91	11.87	7.37	6.07	5.41	4.56	3.16	1.29	0.47	1.27	4.19
1885	6.80	5.47	6.38	7.07	6.02	5.01	3.33	3.08	0.91	2.49	6.03	6.22
1886	8.13	7.65	7.69	12.61	8.78	6.85	6.91	4.36	2.60	4.11	5.95	6.54
1887	7.50	11.89	7.55	8.40	6.62	5.41	4.70	4.79	4.63	4.79	4.69	4.71
1888	5.59	7.75	7.14	5.94	5.96	5.17	4.77	4.11	6.82	8.14	6.52	5.97
1889	7.94	7.49	6.22	5.51	6.51	8.98	6.99	6.31	5.83	5.59	8.32	5.74
1890	7.14	11.28	11.59	8.79	8.26	4.02	2.80	3.66	3.93	6.19	4.85	5.32
1891	9.79	13.42	10.93	10.26	4.79	6.67	3.89	4.43	3.36	2.35	3.65	5.69
1892	8.67	5.87	8.61	9.60	6.67	5.92	3.17	2.49	2.06	1.59	2.90	4.04
1893	4.18	10.32	6.30	6.45	8.75	5.37	3.09	2.32	4.58	6.04	4.31	4.54
1894	5.06	7.67	6.84	5.12	4.97	3.26	2.20	2.02	1.21	1.37	2.52	3.80
1895	8.09	3.42	9.11	7.97	5.87	2.89	3.69	3.08	2.17	1.02	1.75	3.20
1896	4.03	6.70	8.10	7.79	5.03	4.45	6.59	4.36	2.35	4.61	5.22	6.13
1897	4.57	2.47	9.14	6.15	6.93	5.39	6.44	3.09	1.44	1.63	1.88	4.64
1898	7.02	5.24	7.27	7.60	6.64	3.37	3.88	7.53	3.98	5.30	6.78	5.85
1899	8.42	9.81	13.58	6.37	6.92	6.68	4.96	4.17	3.03	2.05	4.44	5.20
1900	4.69	6.97	9.52	6.14	5.63	5.86	5.27	3.32	2.19	9.45	14.10	7.65
1901	6.91	5.39	7.14	13.74	10.93	10.23	6.33	7.72	5.76	5.25	.....	14.04
1902	7.89	8.27	11.78	7.80	6.39	5.63	6.73	6.69	6.37	6.42	6.79	6.69
1903	7.08	10.20	10.99	9.24	5.94	6.73	6.78	6.90	6.79	6.67	6.85	3.28
1904	3.94	4.85	7.01	6.32	6.69	6.65	6.95	6.89	6.59	6.92	7.02	7.22
1905	5.28	4.60	8.42	6.29	8.65	6.97	7.65	7.42	7.38	7.40	7.29	6.69
1906	8.33	5.68	8.45	7.61	6.42	7.29	6.76	6.80	6.71	7.12	7.34	7.49
1907	10.51	6.27	[illegible]	8.57	6.51	9.42	6.52	7.12	7.09	6.11	7.61	7.41
1908	7.90	8.74	10.09	10.78	7.76	6.58	7.14	7.14	6.65	6.84	6.67	7.04
1909	7.15	7.89	7.76	7.45	7.64	7.23	7.18	6.86	7.06	6.89	6.92	4.86
1910	6.98	7.33	6.88	7.54	7.52	8.93	7.02	6.93	7.02	7.12	7.19	5.72
1911	9.29	7.88	7.99	9.05	6.64	6.91	6.95	6.92	7.10	7.66	7.42	7.69
1912	5.41	6.66	10.90	8.12	8.01	7.17	7.14	7.29	7.18	7.12	7.06	6.74

Average Gauge Reading of Kanawha River for Each Year from July 1, 1873, to December 1, 1912, taken at Charleston, W. Va., by the U. S. Engineers.

Years		Years	
1873	6.70	1893	5.52
1874	6.61	1894	3.84
1875	7.14	1895	4.35
1876	6.09	1896	5.44
1877	5.79	1897	5.31
1878	7.24	1898	5.87
1879	5.25	1899	6.30
1880	5.33	1900	6.56
1881	4.95	1901	8.49
1882	6.77	1902	7.28
1883	5.98	1903	7.29
1884	5.82	1904	6.42
1885	4.90	1905	7.00
1886	6.85	1906	7.16
1887	6.30	1907	7.70
1888	6.15	1908	7.75
1889	6.78	1909	7.07
1890	6.49	1910	7.18
1891	6.60	1911	7.62
1892	5.08	1912	7.43

A more complete description of the Kanawha and its chief tributaries in Fayette County will be given on subsequent pages in Chapter II.

Steam Railroads.

Chesapeake & Ohio.

Main Line.—The main line of the Chesapeake & Ohio Railway crosses Fayette in a northeast-southwest direction, following the valleys of Kanawha and New Rivers and almost bisecting the County. The road-bed is double-tracked from Clifton Forge, Va., to Cincinnati, Ohio, excepting a few short stretches in tunnels and along the gorge of New River from Gauley Junction to Cotton Hill. Between the bridge at Hawks Nest and that just below Sewell, the east-bound track is on the west bank of New River, and the west-bound on the east bank. Its total length across Fayette is 57 miles. On pages 191-2 of the Semi-Centennial History of West Virginia, J. M. Callahan gives the following interesting account of its early history, organization and construction:

"The Chesapeake and Ohio Railway traversing one of the most picturesque regions of West Virginia is the successor of the Covington and Ohio Railroad, which was organized as an extension of the Virginia Central (incorporated 1850) the successor of the Louisa Railroad which obtained its charter in 1836. The Virginia Central received its charter under the influence of a state policy to link Chesapeake Bay and the Ohio River by a railway, and construction was prosecuted by state appropriations until 1861, when the line was in operation to Jackson's River (ten miles east of Covington). It was operated to Covington in 1867. Work on the Covington and Ohio, abandoned in 1861, was resumed in 1868 under charters of incorporation secured from the legislature of both Virginia and West Virginia in 1865, and under later acts of 1867 which conferred additional privileges. Commissioners, appointed by the two states to cooperate in enlisting the interest of capitalists and the early completion of the road, experienced great difficulty in securing the financial aid necessary to meet the heavy expense of construction. In August they finally contracted with the Virginia Central Railway company which undertook the construction. Under this arrangement the name of the road was changed to the Chesapeake and Ohio. Its president, General William C. Wickham, succeeded in attracting the interest of Collis P. Huntington and his associates who in November, 1869, made a contract which insured the successful completion of the road.

"On June 9, 1870, the new road acquired from Virginia the title to the Blue Ridge Railroad, which Virginia had constructed through the mountains.

"The new road was aided by the state through an act of 1868 which authorized townships to hold special elections to determine whether they would purchase stock. It also received aid from the sale of public land. The policy of the state to aid the road created much opposition, to which railroad men actively replied.

"In the **Greenbrier Independent** in 1872 appeared articles opposing the road on the ground that it carried whiskey, killed chickens and cows, scared the horses, and threw teamsters out of employment.

"Construction westward to Huntington was pushed vigorously. From 1869 to 1873 engineering corps and contractors were busy in the Alleghanies, in the Greenbrier Valley, along the canyon of New River and the bottom lands of the Kanawha, and across Teay's valley, until continuous rails completed the new link between East and West. The full story of the work done would tell of hardships and dangers bravely borne, and of the faith and patience of skill and intelligence.

"The materials for construction were brought over land in wagons or down the Greenbrier River in bateaux. The labor used in construction was largely furnished by colored laborers from Virginia. The employees for several years were principally Virginians.

"On January 29, 1873, the last spike was driven on the New River bridge at Hawk's Nest, and the special Richmond train of President Wickham proceeded westward to Charleston and to Huntington. At Charleston the event was celebrated by appropriate display of speeches, terminating in a great display of fireworks. At Huntington the union of opposing waters by bands of steel was celebrated by pouring into the Ohio a barrel of James River water brought from Richmond. The president, in his speech, emphasized four great advantages of the road: (1) shortness of route between the Ohio and Norfolk harbor; (2) its easy grade and reduced number of curves; (3) the mild climate along the route; (4) the short distance of its Huntington terminus from Cincinnati.

"The service of the road for several years was very inefficient and the tonnage very light. Only local passenger trains, and only a few freight trains were operated. The first engines were fired with cord-wood."

In Fayette many branch lines have been constructed from the main line up the larger tributaries of the Kanawha and New Rivers to tap rich coal fields. These will now be described.

Powellton Branch—C. & O. R. R.—This branch of the Chesapeake & Ohio system extends southeastward along the valley of Armstrong Creek from Mount Carbon to the head of Right Fork, 2 miles above Powellton, a total of 8 miles, and was completed about March, 1905. It transports to the main line lumber, and coal from 6 mining operations on the No. 2 Gas and Powellton Coal beds.

Paint Creek Branch—C. &. O. R. R.—This branch of the Chesapeake & Ohio extends southeastward from Paint Creek Junction in Kanawha County to Kingston in Fayette for a distance of 20 miles, its length in the latter County being only 8 miles. It was completed to Keeferton in June, 1905, and later (May, 1911), extended to its present terminus at Kingston. It furnishes transportation for coal from a large number of mining operations in each county.

Gauley Branch—C. & O. R. R.—This branch of the Chesapeake & Ohio extends from Gauley Junction northward along Gauley River and the waters of Twentymile Creek to Greendale, Nicholas County, a distance of 14.2 miles. It was completed in 1893-4 from Gauley to Greendale, and in September, 1904, extended to Carterboro. This is an important freight feeder for the main line, in that it transports large quantities of coal and lumber.

Mill Creek Branch—C. & O. R. R.—This branch of the Chesapeake & Ohio Railway extends northeastward along Mill Creek waters from Hawks Nest to Ansted, a distance of about 3 miles, and was completed as a broad-gauge road in August, 1890. Coal constitutes the chief source of freight, there being three large mining operations on the No. 2 Gas bed just north and northeast of Ansted, and another on the Sewell seam, ½ mile above Hawks Nest.

Keeney Creek Branch—C. & O. R. R.—This branch of the Chesapeake & Ohio Railway extends northeastward along Keeney Creek to Lookout, a distance of 4 miles, but, measured along the railway, 7 miles, the latter result being caused by a long switchback northwestward from Keeney Creek Station along the steep east valley-wall of New River gorge in order to attain sufficient elevation to overcome the rapid fall in the gradient of the bed of Keeney Creek in the lower mile and a half of its course. Coal from several operations in the Sewell bed is the main source of freight. The road was completed in December, 1894.

Arbuckle Creek Branch—C. & O. R. R.—This branch of the Chesapeake & Ohio was completed in June, 1904, and extends westward from Thurmond along the precipitous west hillside of New River and up Arbuckle Creek to Minden, a distance of about 5 miles. Coal from the mines in the Sewell bed near Minden is the chief source of freight.

Loup Creek Branch—C. & O. R. R.—This branch of the Chesapeake & Ohio Railway was begun in 1892, completed to Macdonald in January, 1894, and extends southwestward from Thurmond along Dunloup Creek to Price Hill, a distance of about 14 miles. Coal from a large number of mining operations, mostly in the Sewell bed, is the chief source of freight. It traverses a better agricultural region than any of the branches previously described.

Laurel Creek Branch—C. & O. R. R.—This branch of the Chesapeake & Ohio was completed to Gentry in October, 1904, and extends northeastward from Quinnimont on the main line along Laurel Creek to Gentry (Layland), a distance of about 7 miles. Coal is the chief source of freight from nine operations on the Fire Creek Coal bed.

White Oak Branch—C. & O. R. R.—This branch of the Chesapeake & Ohio Railway, completed in December, 1900, extends northward from Whiteoak Junction on the Loup Creek Branch of the C. & O. R. R. along Whiteoak Creek to Lochgelly, (formerly Stuart), a distance of about 10 miles. It traverses a good agricultural region, but coal is the chief source of freight from mining operations in the Sewell bed.

Kanawha & Michigan Railroad.

The **main line** of the Kanawha & Michigan Railroad extends from Gauley Bridge along the north bank of Kanawha River northwestward in Fayette, crossing the Kanawha County Line near the mouth of Smithers Creek, just above Cannelton. Northwestward from the latter point, the road continues along the north bank of the Kanawha to Point Pleasant and thence with its connections across Ohio to the Great Lakes. The portion of the main line included in Fayette is about 11 miles in length. The road was completed eastward to Charleston in 1892 and to Gauley Bridge in 1894. It hauls large quantities of lumber, coal, coke, salt, chrome ore, and lime.

Smithers Creek Branch—K. & M. R. R.—This branch of the Kanawha & Michigan extends northeastward from Cannelton along Smithers Creek to Marting, a distance of about 5 miles. It hauls a large tonnage of coal from operations on the No. 2 Gas and Eagle beds.

Virginian Railway.

The Virginian Railway extends from Deepwater, Fayette County, on the main line of the Chesapeake & Ohio southward to the head of Loop Creek and across onto the waters of Paint Creek, intersecting the Fayette-Raleigh County Line, ½ mile south of Herberton, its total mileage being about 28 in the territory of this Report. From the latter point it continues on southward across Raleigh, Wyoming, and Mercer Counties, and thence eastward across the State of Virginia to tidewater at Sewalls Point. The road was begun in 1894 by the construction of a 5-mile stretch southward from Deepwater to serve certain lumber interests in that locality. In 1902 the extension of this road with a straighter alignment and lighter grades was begun. In 1907 the Deepwater Railway of West Virginia and the Tidewater Railway of Virginia, both owned by the late H. H. Rogers of New York City, were incorporated as the Virginian Railway. Mullens was its terminus in March, 1907, and on July 1, 1909, it was in operation throughout its entire course from Deepwater to tidewater at Sewalls Point and Norfolk. No expense was spared by Rogers to secure the best possible alignment and grade through the mountainous region of West Virginia to the great coal deposits of the counties traversed, as also in the State of Virginia, and its final location was decided upon only after several thousand miles of field surveys had been made. In addition to a very heavy coal traffic it receives large shipments of lumber throughout its course in West Virginia.

In Fayette it has a short branch line, less than 2 miles long, connecting Bishop on its main line with Oak Hill on the White Oak Branch of the Chesapeake & Ohio Railway system.

Manns Creek Railroad.

The Manns Creek Railroad extends from Sewell on the main line of the Chesapeake & Ohio Railway eastward along Manns Creek to Clifftop and Landisburg, with a total length of about 10 miles, all in Fayette County. It carries a large amount of lumber from mills at Landisburg and coal from mining operations in the Sewell bed near Clifftop, the coal being coked in a battery of bee-hive ovens at Sewell.

Sewell Valley Railroad.

The Sewell Valley Railroad extends from Meadow Creek Station on the main line of the Chesapeake & Ohio Railway northeastward along Meadow Creek and down Sewell Creek to Rainelle on Meadow River, and thence down the latter stream to Wilderness (Nallen P. O.), ½ mile north of the common corner of Fayette, Greenbrier, and Nicholas Counties. It has an immense traffic in lumber from the large band mills at Rainelle, Honeydew and Nallen. It also carries the commercial coal production of a mine in what appears to be the No. 6 Pocahontas bed, 1 mile northward from Rainelle.

That portion from Meadow Creek to Rainelle was completed several years ago and that below the latter point to Wilderness, during the early part of 1916.

Kanawha, Glen Jean & Eastern Railroad.

The Kanawha, Glen Jean and Eastern Railway extends southward from Glen Jean on the Loup Creek Branch of the C. & O. R. R. to Macdonald and thence westward to a connection with the Virginian Railway at Pax. It was constructed in 1913, according to C. E. Krebs. It has also a short branch line extending southward from Macdonald to Tamroy on the head of Dunloup Creek in Raleigh County. Its total length, including the two and a half miles in Raleigh, is about 15 miles. Coal from several mining operations on the Sewell bed is the chief source of freight, although it traverses a fair agricultural region.

Highways.

In Fayette County the public highways consist largely of unimproved dirt roads and bridle paths. With one or two exceptions the existing wagon roads are generally narrow, rough, and poorly graded, many of the streams not being bridged, thus making it difficult and somewhat hazardous to travel over them during the winter season. The prevailing sandy soil of the Pottsville Series tends to prevent muddy roads wherever an attempt has seriously been made to drain the road-bed, and this feature, in connection with an abundance of sandstone material always near at hand renders it possible to construct cheaply a fair road-surface adapted to light traffic.

The road mileage is reported by A. D. Williams, Chairman of the State Road Commission, by magisterial districts as follows:

District	Miles.
Falls	78
Kanawha	99
Mountain Cove	138
Nuttall	83
Fayetteville	128
Sewell Mountain	122
Quinnimont	103
Total	751

Within recent years the general use of the automobile has created a marked revival of interest in hard surface roads, four magisterial districts having voted bonds for this purpose as shown in the following table from information supplied by Mr. Williams:

Name of District	Date of Election	Kind of Bond	Rate of Interest	Amount
Fayetteville	May 23, 1916	Serial	5%	$600,000.00
Falls	May 23, 1916	Serial	5%	175,000.00
Nuttall	May 23, 1916	Serial	5%	100,000.00
Sewell Mountain	June 13, 1916	Serial	5%	175,000.00

Total amount of bonds voted for Fayette County.....$1,050,000.00

James River & Kanawha Turnpike.—One of the first roads to be built in Fayette County was the James River & Kanawha Turnpike which extends eastward from Montgomery along the north bank of Kanawha River to Gauley Bridge, and thence eastward via Ansted, Mountain Cove, Hico, Divide, Clifftop, Ravenseye, and Maywood, crossing the Fayette-Greenbrier County Line one-half mile west of Rainelle. A "State Road" for wagons was first completed across the Alleghany Mountains to the navigable waters of the Kanawha by 1790 and opened to the Ohio River by 1800 according to J. M. Callahan[1]. The route of the present location of the road was decided upon in 1821 and by 1824 it was completed between Lewisburg and Kanawha Falls and in three years to a point 26 miles above Charleston. The following interesting account by Callahan of the influence of this turnpike and the travel over it is taken from pages 99-101 of the reference last cited:

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[1] Semi-Centennial History of W. Va., p. 92; 1913.

"Among the local influences attributed to the turnpike were the decrease of game, the increase of evidence of civilization resulting partly from the immigration of families of refined people from eastern Virginia, and the economic and industrial development resulting from market facilities and the increase of passing travel and traffic.

"The route soon became a busy thoroughfare of travel and traffic—an avenue of activity and increasing wealth. In the stage the average citizen might ride with the greatest statesmen and converse with them en route or at the taverns. Among the passengers of most prominence were Henry Clay, who was a great favorite along the route, and President Jackson, who in 1832 spent Sunday at Charleston en route to Washington. Many of the wealthier people who disdained to ride in the stage with the common herd travelled in their own private conveyances. Many who were too poor to pay the stage fares travelled by horseback or walked.

"Westward over the route passed many families emigrating to Ohio and Kentucky. Hundreds of wagons and other conveyances filled with emigrant families—men, women and children of all ages and conditions—who had left the worn-out lands of Virginia to seek new homes in the states bordering on the Ohio, passed along the road for weeks each year. To some of the more conservative Virginians mourning over the increasing drain of the population, this spectacle of fugitive emigrants 'Bending their toilsome march to the far West' awakened a melancholy train of reflections in regard to what was characterized as 'the last struggle of despairing poverty to escape from the hardships of its lot.' The road furnished increased facility for driving hogs to the eastern market, and consequently increased the demand for corn along the route. It was estimated that in the fall of 1826, about 60,000 hogs passed up the valley of the Kanawha, destined largely to Eastern Virginia. This traffic continued until the Civil War, although part of it was diverted by steamboat to Pittsburgh and Wheeling in the decade before the war. It stimulated the growth of corn among the farmers, some of whom took advantage of their less enterprising neighbors by meeting the drovers several miles toward the West in order to make advance bargains. It is said that the soil of Teay's valley was worn out by continued cultivation of corn to supply the demand of hog traffic. Sometimes the drovers greatly interfered with other travel for days at a time. After driving the stock through to the Valley, or to Richmond or other eastern cities, they frequently made the return trip on foot.

"Freight was usually carried in Conestoga wagons, often painted in gay colors, usually drawn by four or six horses and carrying an average of 1,000 pounds per horse. Even after 1852 these wagons were so common that sometimes as many as thirty could be counted in a few hours passing in close proximity and twelve or fifteen could be counted almost any day within the period of travel. Those going east usually included salt in their list of goods. Those coming west were loaded with fruit, and general merchandise—including much plug tobacco to satisfy the refined taste of the western pioneers who were not content with the raw product which they grew at home. Whiskey was also a common article carried on almost every wagon. Many of the wagoners, who endured the hardships of the long journey, 'left their religion on the Blue Ridge when they went east with their produce,' but, although often rough, they were a jolly crowd who at night enjoyed themselves with fiddling and with bull dances around their camp fires, or with singing negro melodies of which they possessed a fine repertoire. They bought their provisions from the farmers or at the taverns, but they cooked their own meals and drank their own whiskey.

"In contrast with the freight wagoners, the stage drivers (young but expert) were aristocratic—stopping at the best taverns and conversing freely with their passengers. The horses behind which they wielded the whip were the finest that could be obtained from the blue-grass region of Kentucky or the Valley of Virginia and were dressed in the finest harness ornamented in brass. Each stage driver drove at a rapid rate, and swiftly turned the shortest curves of the mountains without fear of danger. Unless hailed by prospective passengers he seldom stopped until he reached a relay station—the approach to which he announced by blasts from the tin horn which he always carried at his side. For his expert service he received about $1.00 per day, the highest wage paid on the road at that time."

Giles, Fayette & Kanawha Turnpike.—This road extends from Giles County, Virginia, through Mercer into Raleigh via Beckley and into Fayette at the head of Dunloup Creek, thence running via Oakhill and Fayetteville and joining the James River and Kanawha Turnpike at Kanawha Falls. Its construction was begun in 1838 and it was completed about 1848. From Kanawha Falls it now extends along the south bank of Kanawha River on across Fayette to Montgomery at the Kanawha County Line and thence to Charleston.

GENERAL DESCRIPTION, FAYETTE COUNTY.

Miscellaneous Items.

Formation.—Fayette County was formed from Kanawha, Nicholas, Greenbrier, and Logan Counties in 1831. In 1850 part of Fayette County was cut off to form the present County of Raleigh, and in 1871 a small portion was taken to form a part of Summers County. The County was named in honor of General Lafayette, the distinguished Frenchman of Revolutionary fame. From 1831 to 1837 the County-Seat was at New Haven in Mountain Cove District, and then was removed to the house of Abraham Vandal at the present site of Fayetteville until the completion of the public building. The site was then called Vandalia and later Fayetteville which has continued to remain the seat of justice. The earliest settlements in Fayette were made during the latter part of the 18th century, mostly by immigrants from Virginia crossing over the mountains to the western frontiers. The special edition of the

Fayette Journal, issued November 2, 1911, is authority for the foregoing historical data.

Area.—The original area of Fayette was greatly reduced by the cutting off of what is now Raleigh County and part of Summers. Its present area, as determined with planimeter by R. C. Tucker from the accurate topographic sheets of the U. S. Geological Survey, is as follows:

Magisterial District.	Square Miles.
Falls	104.03
Kanawha	107.12
Mountain Cove	33.43
Nuttall	58.53
Fayetteville	164.29
Sewell Mountain	112.46
Quinnimont	86.64
Total for Fayette County	666.50

Relief.—As shown on Map I, accompanying this Report under a separate cover, the surface of Fayette County varies from 597.7 feet above sea-level at pool level of Dam No. 2 of the U. S. Government series at Montgomery, to about 3375 feet above the same datum at the crests of Walnut, Ford, and Myles Knobs along the southeast border of Sewell Mountain District, thus making a maximum range in elevation of about 2775 feet. This feature causes considerable difference in climatic conditions, in that the winters are somewhat longer and more severe on the high plateaus and mountains than along the river valleys.

Population.—The following table, taken from the U. S. Census returns for 1910, shows the population of Fayette County for the last three enumerations:

Population of Fayette County.

District	Years		
	1910	1900	1890
Falls	6,775	1,597	1,099
Fayetteville	20,605	9,889	4,110
Kanawha	7,790	6,078	4,451
Mountain Cove	4,489	4,235	5,123
Nuttall	3,388	3,180	......
Quinnimont	5,525	3,360	2,659
Sewell Mountain	3,331	3,648	3,100
Totals for Fayette County	51,903	31,987	20,542

The above results show that the growth in population in the County as a whole is fairly normal, the percentage of increase from 1890 to 1900 being 50.8, and from 1900 to 1910 being 62.2. That for the entire State for the 10 years ending in 1910 is 27.4, and for the entire United States, 21. The density of population for Fayette in 1910 was 77.8 persons to the square mile, while that for the State in the same year was 49.9, and for continental United States, 30.4. The population should be classed as rural, since there is no town within the county that attains 2500 or more inhabitants. The rapid rate of increase in population is largely due to the development of more than one hundred commercial coal mines within the county.

Products.—The principal animal products of Fayette County are horses, mules, cattle, sheep, hogs, poultry, and dairy products.

The principal vegetable products are lumber, corn, oats, hay, potatoes, buckwheat, garden vegetables, apples, and peaches. Roots of wild plants in the much forested area of the county, such as ginseng, golden seal, blacksnake root, wild ginger, blood root, spikenard, and may-apple, are a considerable source of revenue.

The principal mineral products at present are coal and coke, as thus far no paying oil or gas pool has yet been developed. As described on a subsequent page of this Chapter, ferro-chromium is manufactured at Glen Ferris but from chrome ore imported from South Africa.

Truck farming on the high plateaus of the southeast half of the county could be carried on with great profit, since the intensive coal mine development in this region offers a fine market for all the garden vegetables that could be produced.

Property Valuation.—The State Auditor gives the following property valuations for Fayette County for the years 1915, 1916, and 1917:

	1915	1916	1917
Real Estate	$18,736,830	$18,688,255	$18,781,960
Personal Property	7,561,260	7,360,464	8,574,898
Totals	$26,298,090	$26,048,719	$27,356,858

Towns and Industries.

According to information furnished by John Nuttall, Clerk of the Circuit Court of Fayette County, in September, 1916, there are only eight incorporated towns in the latter area; viz, Fayetteville, Montgomery, Ansted, Oak Hill, Hilltop, Glen Jean, Mt. Hope, and Thurmond. With the exception of Fayetteville, the County-Seat, these will now be described in the decreasing order of their population as shown by the U. S. Census of 1910.

Fayetteville.

Fayetteville, the County-Seat of Fayette, is situated on a high plateau near the geographical center of the County, its nearest railway station being South Fayette in the New River gorge on the Chesapeake & Ohio main line, 1.5 miles northeastward. It was formerly called Vandalia from Abraham Vandal, one of the earliest settlers who kept a tavern there as early as 1830. It was incorporated as the Town of Fayetteville in 1883. The U. S. Census Reports for 1900 and 1910 give its population as 413 and 671, respectively, thus making its increase for the ten years about 62½ per cent., or practically the same rate as that for the whole County during the same decade. The town has no manufacturing industries but it is surrounded by one of the best agricultural regions in the County, since the adjacent hills are comparatively low and flat-topped, thus making tillage feasible, a feature that does not prevail over a large portion of western Fayette.

Montgomery.

Montgomery, the largest town in Fayette, is situated on the south bank of the Kanawha River in the extreme western edge of the County. The special edition of The Fayette Journal of November 2, 1911, gives the following interesting account of its early settlement and progress:

> "The land around Montgomery was originally owned by Levi Morris, having been taken up by him in 1770. He came from Alexandria, Virginia, on a mule and brought with him the shop-made nails

with which the first house was built near the present site of Montgomery.

"Mr. Henry Montgomery, the grandfather of Messrs. S. H., J. C., and J. W. Montgomery, came to this county about the same time with General Andrew Lewis in his campaign against the Indians.

"Mr. James Montgomery, a son of the above mentioned, secured a large tract of land along the Kanawha River, near the present site of Montgomery, and was a big farmer and stock-dealer, often driving large herds of cattle and hogs to Lynchburg and other points in the East. He was also a prominent politician, having been sheriff of the county and the representative in the State Legislature a number of times. He was in the Virginia Legislature when Virginia seceded and was later in the West Virginia Legislature.

"The history of Montgomery dates to about 1860, when boats began to come here from Cincinnati and other points along the Ohio River. The town was then known as Montgomery's Landing and was the distributing point for merchants in Wyoming, Mercer, Raleigh, McDowell, Nicholas and Fayette Counties.

"In 1871 the Chesapeake and Ohio Railroad was built and the station at this place was known as Cannelton. Cannelton had been for a number of years the name of the post-office on the north side of the river, and continued to be the name of the station on the Chesapeake and Ohio until 1890, when the town was incorporated and the name changed to Montgomery.

"In 1876 the Coal Valley Coal Co. began operating a mine here and they laid off the town and changed the name from Montgomery's Landing to Coal Valley. Thus from 1876 to 1890 the place had two names—Coal Valley Post-office and Cannelton Station. When the town was incorporated, as mentioned above, the name of the post-office was also changed to Montgomery."

The U. S. Census Reports of 1900 and 1910 give it a population of 1594 and 1888, respectively, or a gain of only 18.4 per cent., as compared to 62.2 per cent. for the whole County during the same decade.

Preparatory Branch, West Virginia University.—One of the two preparatory schools of the State University is located at Montgomery, this being established and located by an act of the Legislature passed on the 15th day of February, 1895, and the sum of $10,000.00 appropriated for the erection of buildings and the purchase of a site. The Montgomery Heirs donated two acres of land, and the building erected thereon was opened to receive students on January 4, 1897.

According to data given on page 79 of Volume II, Part II, of the Second Biennial Report of the State Board of Control, there is but a single building, consisting of a main or central building with east and west wings, the total frontage toward the river being 207 feet. The class rooms are upon the lower floor, the upper floors of the east wing being used as a dormitory for boys and the corresponding floors in the west wing, for girls. These will accommodate about 30 boys and 20 girls. There are three good class rooms, a very good auditorium, and a study hall.

The two following tables, taken from page 82 of the Report last mentioned, give the enrollment of all classes for the years 1910-1911 and 1911-1912:

Enrollment 1910-1911.

Course	Sr.	Jr.	Soph.	Fr.	8th Gr.	7th Gr.	Males	Females	Total
Academic	7	9	7	23	29	50	52	73	125
Teachers' Class							6	27	33
Music							1	25	26
Graduate Work							1	..	1
Total							60	125	185
Number Counted More Than Once							1	23	24
Net Enrollment							59	102	161

Enrollment 1911-1912.

Course	Sr.	Jr.	Soph.	Fr.	8th Gr.	7th Gr.	Males	Females	Total
Academic	9	4	11	16	63	..	44	59	103
Teachers' Class							5	18	23
Music							1	32	33
Total							50	109	159
Number Counted More Than Once								27	27
Net Enrollment							50	82	132

Ansted.

Ansted, the second largest incorporated town, is located in the western half of Mountain Cove District on Mill Creek at the terminus of the Mill Creek Branch of the C. & O. Railroad, this branch connecting with the main line of the latter at Hawks Nest. Its population in 1910, according to the U. S. Census returns, was 1,030. Its was incorporated as the Town of Ansted on September 16, 1891, and was named after Prof. David Thomas Ansted, a celebrated English geologist, author of Ansted's Geology, a text-book formerly used at West Point Military Academy and Annapolis Naval Academy, who made a report on the Kanawha Valley coals in 1854, found and opened the "Ansted" or No. 2 Gas Coal bed, according to data furnished by Capt. W. N. Page. The following interesting account of its early settlement was taken from page 75 of the special historical edition of The Fayette Journal of November 2, 1911:

> "The earliest settlers at Ansted were 'squatters' who occupied the land without any title. As early as 1790 the families of Jas. Lykins, James Taylor, Baily Woods, William Parrish and others settled here in this manner and built the first church in Fayette County. It was a log building known as the Hopewell Baptist Church, and stood on the Tyree land immediately in the rear of where Fountain Neal now lives.
>
> "The old Indian trail, originally a Buffalo trail, followed afterward by the Indians on their hunting and war expeditions, passed through Ansted over the precise spot where Capt. Page's residence now stands. This trail led from the present site of Lewisburg, Greenbrier County, through Ansted over Gauley Mountain and after various meanderings down Rich Creek, across the Gauley River one and one-half miles above the mouth of Rich Creek, then up Bells Creek and down Kelly Creek, struck the Kanawha River at the mouth of Kelly Creek. This was the only route of travel until 1786, when the Virginia Legislature appropriated funds to open it up as a wagon road. In 1800 the old State road was opened up from Lewisburg to the Kanawha River valley at the falls and in 1825 the James River and Kanawha Turnpike was opened for travel.
>
> "Over the old Indian trail alluded to before, General Andrew Lewis led an army of about one thousand men on the campaign which resulted in the battle of Point Pleasant. Col. Chas. Lewis, a brother of Andrew, commanded a division of the army. He was killed in the battle. During the Civil War armies of both the North and the South camped in the vicinity of Ansted, Generals Rosecrans and Wise having had at different times headquarters in Col. Tyree's residence. General Wise was here at the time of the fight at Carnifex Ferry, between Generals Floyd and Rosecrans."

The town is largely supported by the coal mining industry from operations on the No. 2 Gas bed, although the region immediately to the east and southeast is fairly well adapted to agriculture.

Oak Hill.

Oak Hill, situated near the center of Fayetteville District on the White Oak Branch of the C. & O. Railroad and con-

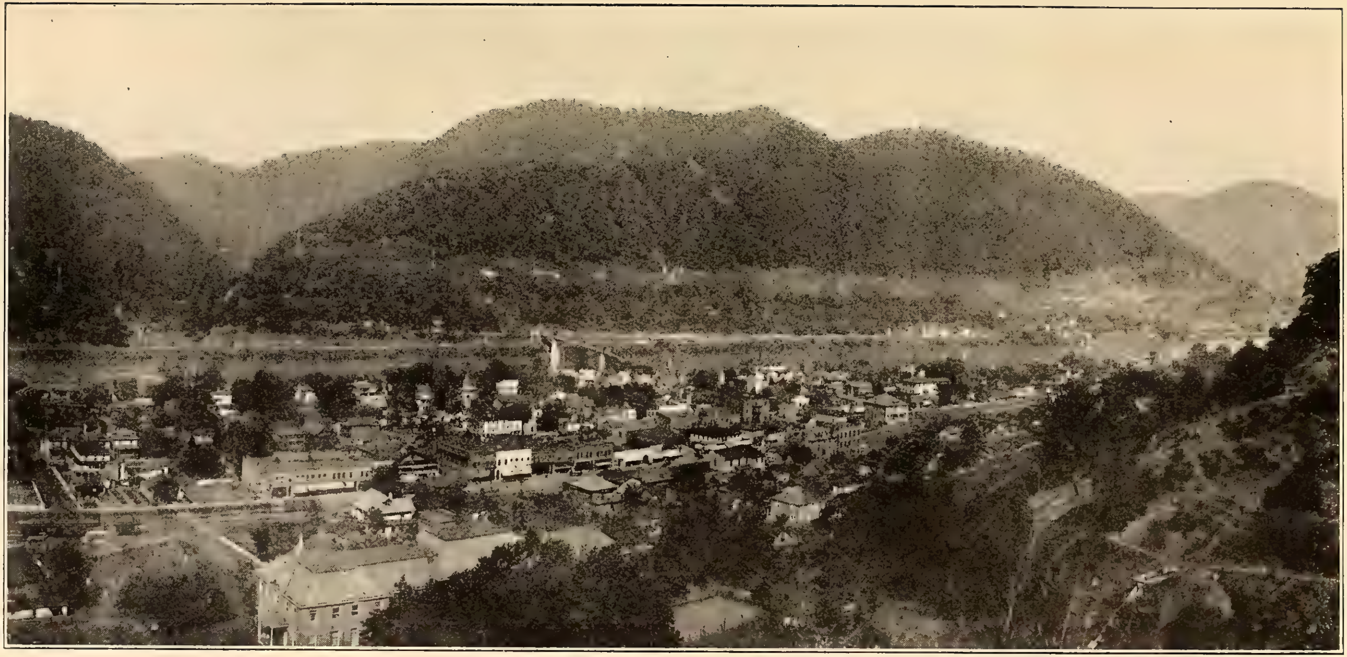

PLATE II.—View of Montgomery looking northward, showing topography of Kanawha Group, the Kanawha River, and main building of Preparatory Branch, W. Va. University, at left foreground.

nected with the Virginian Railway by a short branch line to Bishop, is the third largest incorporated town in the county, the U. S. Census returns of 1910 giving it a population of 764. It was incorporated as the Town of Oak Hill in 1903. Its early settlement occurred about the same time—between 1838 and 1848—as the construction of the Giles, Fayette and Kanawha Turnpike which passes through the town. The following is taken from page 43 of the special historical edition of The Fayette Journal of November 2, 1911:

> "There was a post-office called Oak Hill located at the present site of Hill Top, where all those living in the vicinity received their mail.
>
> "At this time there was some three families living within the present limits of Oak Hill. Chas. Windson kept the toll gate. He lived at the old Captain Richards' place, opposite the road which leads to Minden. William Blake lived at the C. T. Jones' place in a double log house located near the site of the new Jones mansion. The house was of a form then somewhat common, known as a story and a half double log house. Blake's voting precinct took in all the territory reaching to the Raleigh County Line. Mr. Blake was the first settler in the vicinity, having lived there as early probably as 1820. Peter Bowyer, known far and wide as 'Old Pete Bowyer,' operated a water-power mill at the site now known as the Newland place.
>
> "So far as the writer has been able to learn from the oldest residents, these were the only persons living at Oak Hill in 1850."

The town is surrounded by one of the best agricultural regions in the county and is the scene of the annual County Fairs. It is also in close proximity to a number of large commercial coal mining operations on the Sewell bed and is probably now enjoying a more rapid growth than any other town in the county.

Hill Top.

Hill Top, the next largest incorporated town, is located only slightly over two miles southward from that last described, on the Loup Creek Branch of C. & O. Railroad. As mentioned above, the name Oak Hill was first applied to a post-office located at the present site of Hill Top, where the settlers before the Civil War received their mail, the latter being carried by horse from Fayetteville and on to Raleigh Court-House, now Beckley. It is practically joined up with the coal mining towns of Red Star, Harvey, and Prudence. The U. S. Census of 1910 gives its population as 761 only 3 less than for Oak Hill, while that for 1900 gave it only 263, a gain of 189.3 per cent., three times that for the county during the same decade.

Glen Jean.

Glen Jean, the next largest incorporated town, is located on Dunloup Creek at the junction of the Loup Creek and White Oak Branches of the C. & O. Railroad. It is also the northern terminus of the Kanawha, Glen Jean & Eastern Railroad. The U. S. Census of 1910 gives its population as 722. The following data concerning it were taken from page 70 of the special historical edition of The Fayette Journal of November 2, 1911:

> "The history of this thriving and industrious little town dates back only about twenty years, when the Loup Creek Branch of the Chesapeake & Ohio Railroad was built.
>
> "Prior to the building of this road there was nothing at the present site of Glen Jean except one small store and a post-office known at Leblong. This store and office was located near the present site of Mr. McKell's office. The house which is now used as an engineer's and club house was then the home of Mr. John McCoy, who was a farmer and owned all the land around Glen Jean. Mr. T. G. McKell, father of William McKell, saw that there was immense wealth hidden in this land, so he bought Mr. McCoy's entire farm of 200 acres, as well as other tracts of land along Loup Creek.
>
> "The Collins Colliery Company soon began to ship coal from this point and then the town of Glen Jean grew rapidly.
>
> "The name of the post-office was changed from Leblong to Glen Jean, being named after the wife of Mr. T. G. McKell. The name of the post-office was later changed to Collins for a short time, but was soon changed back to Glen Jean."

It was later incorporated as the Town of Glen Jean. It is practically joined up with the coal mining towns of Red Star, Harvey, Hill Top, and Prudence.

Mt. Hope.

Mt. Hope, ranking in 1910 next after Fayetteville in the order of population of incorporated towns, is located in the southern edge of the county, just west of the junction of Sugar and Dunloup Creeks, on the Kanawha, Glen Jean & Eastern, and the Loup Creek Branch of the C. & O. Railroad. The U. S. Census of 1910 gives it a population of 494, and that for

1900 only 351, a gain of 40.7 per cent., a result somewhat less than for the county during the same decade. It was incorporated as the Town of Mt. Hope on June 1, 1895. The following interesting account concerning it was taken from the special edition of The Fayette Journal of November 2, 1911:

> "In the year 1800 the section in and around the present site of Mt. Hope was a wilderness inhabited only by the wild denizens of forest; bears, wolves, deer, etc. As has been stated before in this book, the Indians are not supposed to have occupied the territory of the Kanawha and New River valleys immediately prior to the coming of the whites, but only to have made temporary visits in their hunting and war expeditions.
>
> "It seems quite definitely determined that the first person to make this site his home was Mr. William Blake, who came here as early as 1805, purchased a tract of some seventeen thousand acres, for three cents per acre. Mr. Blake came here from Scotland, bringing his newly married bride, seeking a place where he could enjoy freedom of thought and leaving in Scotland a castle and a large estate. This estate, valued at $6,000,000, is now and long since has been in litigation and the only obstacle preventing the Blake heirs from inheriting the estate is that the precise place and time of Mr. Blake's landing in America can not determined.
>
> "Mr. Blake was one of the pioneers of this section. As late as 1850 the nearest neighbor was a Mr. McCoy who operated a water-power mill at the present site of Glen Jean. Until 1854 the nearest post-offices were at Raleigh and Fayetteville. * * * "

According to the same reference, the town had attained a population of about 1200 persons on March 24, 1910, when a disastrous fire left it a mass of blackened ruins, the loss aggregating one-half million dollars with only one hundred and sixty thousand dollars insurance, and fully 1000 persons rendered homeless. It revived quickly, however, and new houses of brick and stone with much better fire-proof construction largely replaced those that had been destroyed.

Thurmond.

Thurmond, ranking eighth in the descending order of population of the incorporated towns, is located in the southeast edge of Fayette at the mouth of Dunloup Creek along both banks of New River and at the junction of the Loup Creek Branch of the C. & O. Railroad with the main line of the latter system. A round-house and railroad yards are maintained here, and it is claimed that more freight tonnage (chiefly coal) originates at Thurmond than at any other point on the Chesapeake & Ohio Railroad, not excepting Richmond, Va., or Cincinnati, Ohio. According to the U. S. Census of 1910, its population was 315 and it was incorporated as the Town of Thurmond in 1903.

Unincorporated Towns and Villages.

In addition to the foregoing incorporated towns in Fayette there are over a hundred other villages scattered over the county, some of which attain more importance than several of those described above. These are largely coal mining towns built up in connection with one or more mines. The following list, arranged in alphabetical order with coal villages in **black-face type**, gives the approximate population of each:

Population of Unincorporated Villages in 1910.

Name	Population	Name	Population
Backus	167 (R)	**Fire Creek**	260 (R)
Beury	495 (R)	**Gamoca**	23 (R)
Boomer	400 (R)	Gauley Bridge	400 (R)
Boone	190 (R)	**Gentry (Layland)**	410 (R)
Brooklyn (Finlow)	166 (R)	Glade (Krise P. O.)	77 (R)
Brownwood (Lawton)	385 (R)	Glen Ferris	201 (R)
Caperton	200 (R)	**Glen Jean**	722 (R)
Carbondale	600 (R)	**Greenwood**	131 (R)
Carlisle	70 (R)	**Harewood**	88 (R)
Claremont	593 (R)	**Harvey**	55 (R)
Clifftop	350 (R)	**Hawks Nest**	120 (R)
Concho	200 (R)	**Herberton**	205 (R)
Cotton Hill	87 (R)	**Hickory Camp**	130 (R)
Crescent	389 (R)	Honeydew	50 (E)
Deepwater	153 (R)	**Jodie**	27 (R)
Dimmock	49 (R)	Kanawha Falls	200 (R)
Divide	60 (R)	Kaymoor	375 (R)
Donwood	402 (R)	**Kilsyth**	730 (R)
Dothan	125 (R)	**Kimberly**	140 (C)
Dubree	20 (R)	Kincaid	210 (R)
Dunloup	293 (R)	**Kingston**	1800 (E)
Eagle	1350 (R)	Landisburg	210 (R)
Edmond	61 (R)	**Lansing**	161 (R)
Elk Ridge	185 (R)	**Laurel Creek**	100 (R)
Elmo	92 (R)	**Layland (Gentry)**	410 (R)
Elverton	200 (R)	Lively	135 (R)
Ephraim	150 (E)	**Longacre**	157 (R)
Erskine	48 (R)	**Lookout**	210 (R)
Export	31 (R)	**Macdonald**	1153 (R)
Fayette	399 (R)	**Mahan**	130 (R)

Name	Population	Name	Population
McKendree	61 (R)	Rush Run	210 (R)
Meadowbridge (Clute)	100 (E)	Russellville	70 (R)
Milburn	460 (E)	Sanger	50 (R)
Minden	90 (R)	Sewell	410 (R)
Mt. Carbon	475 (R)	Smithers	85 (R)
Newlyn	46 (R)	Springdale	73 (R)
Nuttallburg	410 (R)	Stonecliff	520 (R)
Page	410 (R)	Stuart (Lochgelly)	697 (R)
Parral (Summerlee)	75 (R)	Sun	710 (R)
Pax (Paintsville)	120 (R)	Thayer	403 (R)
Pennbrook	71 (R)	Vanetta	110 (R)
Powellton	413 (R)	Whipple	110 (R)
Prince	235 (R)	Whitney	87 (R)
Prudence	325 (R)	Wilderness (Nallen)	250 (E)
Quinnimont	540 (R)	Winona	1100 (E)
Redstar	375 (R)	Wriston	35 (R)
Robson	231 (R)	Wyndal	175 (R)

(C) Actual count.
(E) Estimate by postmaster or other reliable person.
(R) Rand-McNally.

Climate.

The climate of Fayette is comparatively mild and healthful since the County does not have the rigorous winters of the North nor the intense heat that is experienced during the summer months in the South. The temperature rarely falls much below zero, although reaching this point often during midwinter. The snowfall is practically the same as for other mountain counties in the eastern portion of the State, the snow remaining on the ground only for comparatively short periods. Long-continued blizzards are unknown. The temperature throughout the summer months—June, July, and August—is comparatively low, averaging about 70° F. and rarely exceeding 100° F. Periods of hot weather are of short duration, the nights usually being cool, especially in the plateau region.

The mean annual precipitation of 50 to 60 inches is fairly well distributed throughout the year, the heaviest rainfall occurring from January to June, when it is needed by the growing crops, and lightest in the late summer and fall during the harvest season. Thus the climatic conditions are good for general farming, fruit growing, and stock raising.

The following table, compiled from the records of the Weather Bureau station at Powellton, gives the normal monthly, seasonal, and annual temperature and precipitation at that point, which is 950 feet above sea-level, and is fairly representative of the climatic conditions in the lowland region represented by the western half of Falls and the whole of Kanawha District:

Normal Monthly, Seasonal, and Annual Temperature and Precipitation at Powellton.

Month	Temperature			Precipitation			
	Mean.	Absolute maximum.	Absolute minimum.	Mean.	Total amount for the driest year.	Total amount for the wettest year.	Snow average depth
	°*F.*	°*F.*	°*F.*	*Inches*	*Inches*	*Inches*	*Inches*
December	34	70	—5	3.6	0.9	3.0	4.8
January	34	74	—5	4.1	1.8	4.4	6.1
February	33	68	—20	3.1	5.2	2.1	9.5
Winter	34	....	....	10.8	7.9	9.5	20.4
March	46	83	1	5.2	4.9	5.2	7.0
April	53	93	20	3.2	5.2	2.7	1.7
May	64	93	31	4.7	2.9	3.8	T.
Spring	55	....	....	13.1	13.0	11.7	8.7
June	70	96	42	5.3	5.2	2.8	0.0
July	73	98	46	3.5	4.6	7.6	0.0
August	72	99	42	3.8	1.9	9.6	0.0
Summer	72	....	....	12.6	11.7	20.0	0.0
September	66	99	33	2.4	1.3	1.8	0.0
October	53	92	16	1.4	1.1	3.6	T.
November	44	74	10	3.0	1.7	3.4	1.5
Fall	54	....	....	6.8	4.1	8.8	1.3
Year	53	99	—20	43.3	36.7	50.0	30.6

Average date of first killing frost in fall, Oct. 12; of last in spring, Apr. 23. Date of earliest killing frost in fall, Oct. 1; of latest in spring, May 13.

The following table, compiled from the records of the same Bureau for the station at Beckley with an elevation of 2440 feet above sea-level and in the adjoining County of Raleigh, gives similar data that are fairly representative of the plateau region of Fayette, represented by Mountain Cove, Nuttall, Sewell Mountain, Fayetteville, and Quinnimont Districts, and the eastern portion of Falls:

Normal Monthly, Seasonal, and Annual Temperature and Precipitation at Beckley.

Month	Temperature, mean.	Precipitation.			Month	Temperature, mean.	Precipitation		
		Mean.	Total amount for the driest year.	Total amount for the wettest year.			Mean.	Total amount for the driest year.	Total amount for the wettest year.
	°F.	*Inches.*	*Inches.*	*Inches.*		*°F.*	*Inches.*	*Inches.*	*Inches.*
December ...	33.4	2.96	3.07	4.51	June	67.5	3.64	1.87	68.2
January	31.9	3.33	0.83	7.01	July	72.0	2.58	1.26	4.75
February	29.6	3.16	5.70	1.05	August	70.1	2.71	0.51	4.86
Winter ..	31.6	9.45	9.60	12.57	Summer ..	69.9	8.93	3.64	16.43
March	43.0	3.73	0.82	3.32	September ...	63.0	1.70	1.92	2.65
April	48.3	2.93	1.06	5.44	October	54.0	2.20	2.15	3.38
May	59.7	2.84	2.57	3.13	November ...	42.3	2.39	0.57	5.93
Spring ..	50.3	9.50	4.45	11.89	Fall	53.1	6.29	4.64	11.96
					Year	51.2	34.17	22.33	52.85

CHAPTER II.

PHYSIOGRAPHY

PHYSIOGRAPHIC CHANGES.

The surface features or relief of Fayette are difficult of interpretation, if confined to the County alone, since its surface rocks are so nearly homogenous and frequently so heavily forested that topographic features formed at different periods and under different conditions of erosion, either grade almost imperceptibly into each other, or else are more or less concealed from the observer, especially when the latter is compelled to obtain all possible general and economic geology data in a limited time. The territory lies on the eastern slope of the great Appalachian geosyncline, and its surface features present but little change from that described in previous Reports of the State Survey for the central belt of Counties. An analysis of the physiographic changes indicates that a marked upheaval of the floor of the Appalachian sea took place about the close of the Carboniferous, which during the Cretaceous period was eroded into a peneplain almost level with the sea, the summits of the high hilltops and ridges in the northwest half of Fayette being remnants of this ancient base leveled condition. During the same period (Cretaceous) an uplift in the axis of the Appalachian System to the southeast of the County in question took place which elevated this peneplain and tilted it at a small angle to the northwest. This resulted in a marked increase in the erosive activity of the drainage streams and the formation of another peneplain during the Tertiary period, remnants of which are described on a subsequent page. Another upheaval of the land mass then followed in the Tertiary period, during and after which the streams cut deep narrow channels in the level floors of their old broad valleys. Since the last-mentioned upheaval took place, there has apparently been no marked interruption in stream erosion, and the activity of the present streams indicates that this upward movement may still be progressing, or its cessation so recent that sufficient time has not yet elapsed for streams to widen their valleys appreciably. There is abundant evidence that many of the larger streams attained a base-leveled condition during the formation of the Cretaceous and Tertiary peneplains above mentioned, since these flow in deeply indented valleys with widely meandering courses. The latter feature is probably an inheritance from Cretaceous time, as it would be difficult to explain these sinuous channels on any other ground than that of a previous base-leveled condition. The streams have not advanced very far in their present erosive cycle, measured by the amount of material yet to be removed and as evidenced by their deeply carved and V-shaped valleys, although longitudinally approaching maturity in that many possess a comparatively low gradient almost to their headwaters.

The following table, prepared by Rietz C. Tucker of the Survey Staff from the careful planimetric determinations on the U. S. Geological Survey sheets, gives much interesting data along the line above mentioned for all the streams of major importance in the County. The last column shows the ratio of the total distance (T.D.) measured by the meanders of the stream to the air-line distance (A.L.D.) in that portion of its course designated in the first column. It is self-evident that the nearer this result approaches unity, the straighter the stream's channel becomes:

Table of Stream Data.

STREAMS	Total Fall Feet	Total Distance Miles	Rate of fall per mi.	Air-Line Distance Miles	Ratio T. D. to A.L.D.
Kanawha River, Gauley Bridge to Kanawha Co. Line.....	50	11.6	4.3	7.6	1.5
New River, Summers Co. Line to Gauley Bridge.........	580	48.8	11.9	27.4	1.8
Summers Co. Line to Estuary School	110	14.4	7.6	8.1	1.8
Estuary School to Sewell...	150	15.9	9.4	9.0	1.7

STREAMS	Total Fall Feet	Total Distance Miles	Rate of fall per mi.	Air-Line Distance Miles	Ratio T. D. to A.L.D.
Sewell to Hawks Nest......	200	11.0	18.2	9.9	1.1
Hawks Nest to Gauley Bridge	120	7.5	16.0	5.2	1.4
Smithers Creek, source to Marting	615	3.2	192.2	2.8	1.1
Marting to Cannelton.......	335	4.7	71.3	3.7	1.3
Armstrong Creek, source to mouth of Powellton Fork..	1155	6.6	175.0	6.2	1.1
Mouth Powellton Fork to opposite Boomer.........	220	4.1	53.6	3.8	1.1
Loop Creek, source to mouth..	1325	19.1	69.3	12.1	1.6
Loop Creek, source to Wriston	550	4.6	119.6	4.2	1.1
Wriston to Page...........	300	5.9	50.8	3.9	1.5
Page to Deepwater.........	475	8.6	55.2	5.4	1.6
Falls Creek, source to Kanawha Falls................	1365	3.4	401.5	2.8	1.2
Gauley River, Carnifex Ferry to Gauley Bridge.........	530	28.8	18.4	13.9	2.1
Gauley River, Carnifex Ferry to mouth Horseshoe Creek	370	14.6	25.3	6.8	2.1
Horseshoe Creek to Belva..	100	8.7	11.5	7.1	1.2
Belva to Gauley Bridge.....	60	5.5	10.9	4.8	1.1
Rich Creek, source to Romont	1330	2.5	532.0	2.1	1.2
Romont to mouth...........	490	5.1	96.1	4.1	1.2
Sugar Creek, source to mouth	1460	3.2	456.2	2.9	1.1
Horseshoe Creek, source to Mulvane	380	1.1	345.4	1.0	1.1
Mulvane to mouth..........	620	2.8	221.4	2.7	1.04
Laurel Creek, source to Ramsey	280	1.6	171.0	1.3	1.2
Ramsey to mouth...........	530	3.9	135.9	3.3	1.2
Meadow River, Greenbrier Co. Line to Carnifex Ferry....	1200	28.8	41.6	17.5	1.6
Meadow River, Greenbrier Co. Line to Russellville.......	490	15.0	32.6	9.4	1.6
Russellville to Nicholas Co. Line	30	2.4	12.5	1.9	1.3
Nicholas Co. Line to Carnifex Ferry................	680	11.4	59.6	7.2	1.6
Dogwood Creek, source to mouth	660	5.0	132.0	4.7	1.1
Glade Creek, source to mouth..	560	6.6	84.8	5.9	1.1
Brackens Creek, source to mouth Road Fork.........	470	4.6	102.2	3.8	1.2
Brackens Creek, Road Fork to Russellville	140	3.1	45.2	2.7	1.1
Laurel Creek, source to Rader Ford	870	6.3	138.1	3.9	1.6
Sewell Creek, source to mouth	480	11.8	40.7	6.2	1.9
Sewell Creek, source to Springdale	125	2.6	47.7	2.2	1.2
Springdale to Sievy Bridge..	260	3.9	66.7	3.6	1.1
Sievy Bridge to Sims.......	50	1.9	26.3	1.7	1.1
Sims to mouth..............	45	3.4	13.2	3.2	1.1

STREAMS	Total Fall Feet	Total Distance Miles	Rate of fall per mi.	Air-Line Distance Miles	Ratio T. D. to A.L.D.
NEW RIVER TRIBUTARIES					
Laurel Creek, source to Dempsey	560	3.9	143.6	3.0	1.3
Dempsey to Cotton Hill	585	5.7	102.6	4.2	1.4
Mill Creek, source to mouth	1600	11.5	139.1	7.4	1.6
Mill Creek, source to Opossum Creek	860	6.1	141.0	4.6	1.3
Opossum Creek to Osborne Creek	225	3.1	72.6	2.7	1.1
Osborne Creek to Ansted	145	1.8	80.6	1.4	1.3
Ansted to Hawks Nest	320	1.5	246.7	1.3	1.1
Opossum Creek, source to mouth	450	3.5	128.6	3.3	1.1
Osborne Creek, source to mouth	675	4.7	143.6	4.2	1.1
Wolf Creek, source to House Branch	300	7.9	37.9	5.1	1.5
House Branch to mouth	820	1.2	683.3	1.1	1.1
Fern Creek, source to mouth	1510	5.6	269.6	4.9	1.1
Keeney Creek, source to Lookout	300	2.7	111.1	2.1	1.3
Lookout to Boone	550	2.9	189.6	2.7	1.1
Boone to Keeney Creek	670	1.5	446.7	1.1	1.4
Manns Creek, source to Clifftop	460	6.7	68.7	5.2	1.3
Clifftop to mouth of Glade Creek	540	1.9	284.2	1.7	1.1
Glade Creek to mouth (Sewell)	770	3.0	256.7	2.9	1.03
Glade Creek, source to mouth of Smoky Branch	680	6.9	98.5	5.3	1.3
Smoky Branch to mouth	750	5.3	141.5	4.5	1.2
Laurel Creek	660	5.5	120.0	5.0	1.1
Ephraim Creek, source to Pennbrook	2100	4.4	477.3	3.9	1.1
Fire Creek, source to Fire Creek	1425	2.4	593.8	2.2	1.1
Arbuckle Creek, source (Parral) to Ogden	650	3.4	191.2	3.2	1.1
Ogden to mouth	575	3.0	191.7	2.8	1.1
Dunloup Creek, Price Hill to Macdonald	100	2.3	43.5	1.8	1.3
Macdonald to Glen Jean	100	3.9	25.6	2.2	1.8
Glen Jean to mouth	560	6.2	90.3	4.5	1.4
Mill Creek, source to Hickory Branch	750	3.0	250.0	2.5	1.2
Hickory Branch to mouth	150	1.5	100.0	1.3	1.1
Sugar Creek, source to mouth (Macdonald)	550	2.8	196.4	2.2	1.3
Whiteoak Creek, Carlisle to Scarbro	300	2.0	150.0	1.7	1.2
Scarbro to Whiteoak Junction	80	1.6	50.0	1.5	1.1
Meadow Fork, source to Sanger	240	2.6	92.3	2.1	1.2

STREAMS	Total Fall Feet	Total Distance Miles	Rate of fall per mi.	Air-Line Distance Miles	Ratio T. D. to A.L.D.
Sanger to Newlyn	420	1.4	300.0	1.3	1.1
Buffalo Creek, source to mouth	1750	3.6	486.1	3.2	1.1
Slater Creek, source to Thayer	1960	4.8	408.3	3.2	1.5
Dowdy Creek, source to mouth	1630	3.2	509.3	2.8	1.1
Laurel Creek, source to Rock of Ages School	220	1.3	169.2	1.2	1.1
Rock of Ages School to mouth Bear Branch	280	1.5	186.7	1.4	1.1
Bear Branch to Chestnut Knob Fork	550	4.1	134.1	3.6	1.1
Chestnut Knob Fork to Little Laurel Creek	150	1.0	150.0	0.9	1.1
Little Laurel Creek to Quinnimont	710	3.9	182.1	3.5	1.1
Meadow Creek, source to Lefthand Creek	610	2.9	210.3	2.6	1.1
Lefthand Creek to Beelick Branch	880	3.7	237.8	3.0	1.2
Beelick Branch to Meadow Creek	290	2.5	116.0	2.3	1.1
Paint Creek, Boyd Branch to Lively	25	4.1	6.1	3.5	1.2
Lively to Mossy	190	4.0	47.5	2.9	1.4
Mossy to Keeferton	200	3.8	52.6	2.4	1.6
Keeferton to Burnwell	375	6.5	57.7	5.1	1.3
Packs Branch, source to mouth	370	4.0	92.5	3.6	1.1
Plumorchard Creek, source to mouth	450	3.8	118.4	3.0	1.3
Mossy Creek, source to Dothan	400	2.0	200.0	1.7	1.2
Dothan to Mossy	275	4.0	68.7	3.3	1.2
Cabin Creek, source to Kanawha Co. Line	950	1.7	558.8	1.6	1.1

The sinuous courses of many of the above-listed streams, as indicated by the right-hand column, have evidently been inherited from their ancient base-leveled channels of the Cretaceous peneplain heretofore mentiond, rather than to any interruption in comparatively recent time to the direction of flow by intersection with prominent structural features. The influence of geologic structure since the upheaval near the close of the Cretaceous period has been very slight on the direction of the present drainage, with the possible exception of the Mann Mountain Anticline, described fully on a subsequent page in Chapter III. The latter fold practically coincides with the divide between the waters of New and

Meadow Rivers northward from the Sewell Mountain-Quinnimont District Line, so that its formation must have been synchronous with possibly the upheaval of the Cretaceous peneplain heretofore suggested. With this exception the streams of Fayette preserve their general northwest direction intact.

DRAINAGE BASINS.

The entire drainage of Fayette County reaches the Gulf of Mexico via the Ohio and Mississippi Rivers through the Kanawha and its several tributaries. The three following tables give the area of that portion of the drainage basin included within the county of several important streams and was prepared by R. C. Tucker from planimetric determinations on the accurate sheets of the U. S. Geological Survey. These should furnish valuable data for use in any contemplated water-power project:

Area of Drainage Basins by Districts in Square Miles, with Percentage of Area Drained by Each River System.

Districts	Kanawha River,	New River,	Gauley River,	Meadow River,	Totals
Falls	25.44	5.19	67.69	5.71	104.03
Percentage of District drained by	24.45	5.00	65.07	5.48	(100.00)
Fayetteville	46.23	118.06	......	......	164.29
Percentage of District drained by	28.14	71.86	......	......	(100.00)
Kanawha	104.00	3.12	......	......	107.12
Percentage of District drained by	97.09	2.91	......	......	(100.00)
Mountain Cove	......	33.43	......	......	33.43
Percentage of District drained by	......	100.00	......	......	(100.00)
Nuttall	......	22.60	......	35.93	58.53
Percentage of District drained by	......	38.61	......	61.39	(100.00)
Quinnimont	......	71.48	......	15.16	86.64
Percentage of District drained by	......	82.50	......	17.50	(100.00)
Sewell Mountain	......	72.52	......	39.94	112.46
Percentage of District drained by	......	64.48	......	35.52	(100.00)
Totals	175.67	326.40	67.69	96.74	666.50
Percentage of Fayette County Drained by	26.36	48.97	10.16	14.51	(100.00)

Area of Drainage Basins of Rivers in Each District in Square Miles.

District	Total Area	Kanawha	New	Gauley	Meadow
Falls	104.03	25.44	5.19	67.69	5.71
Fayetteville	164.29	46.23	118.06	......	......
Kanawha	107.12	104.00	3.12	......	......
Mountain Cove	33.43	......	33.43	......	......
Nuttall	58.53	......	22.60	......	35.93
Quinnimont	86.64	......	71.48	......	15.16
Sewell Mountain	112.46	......	72.52	......	39.94
Totals	666.50	175.67	326.40	67.69	96.74

Area of Drainage Basins
(Included in Fayette County).

Streams	Square Miles
Kanawha River	175.67
Morris Creek	3.70
Smithers Creek	13.67
Boomer Branch	2.74
Armstrong Creek	21.93
Jarrett Branch	1.76
Loop Creek	49.53
Paddy Branch	0.52
Lee Branch	0.60
Falls Creek	2.90
Riggs Branch	0.53
Paint Creek	63.35
Cabin Creek	1.56
New River	326.40
Laurel Branch	1.22
Cane Branch	2.27
Big Creek	1.95
Honey Branch	0.52
Laurel Creek	21.45
Turkey Creek	1.61
Mill Creek	28.89
Penfield Branch	1.14
Marr Branch	3.05
Wolf Creek	17.15
Fern Creek	3.44
Butcher Branch	1.09
Craig Branch	1.20
Short Creek	2.17
Keeney Creek	8.78
Coal Run	4.27
Manns—Glade Creek	60.30
Ephraim Creek	5.92
Fire Creek	1.49

Area of Drainage Basins (Continued).

Streams	Square Miles
Rush Run	2.15
Arbuckle Creek	8.62
Dunloup Creek	39.33
Buffalo Creek	5.13
Slater Creek	3.31
Dowdy Creek	2.10
Laurel Creek	24.70
Camp Branch	0.92
Davis Branch	0.92
Meadow Creek	17.70
Gauley River	67.69
Scrabble Creek	4.15
Sand Branch	2.23
Big Creek	4.97
Rockcamp Branch	0.55
Bells Creek of Twentymile Creek	5.95
Rich Creek	13.90
Sugar Creek	2.43
Horseshoe Creek	4.27
Laurel Creek	6.67
Ramsey Branch	3.45
Staton Branch	2.25
Meadow River	96.74
Dogwood Creek	5.64
Hedricks Creek	4.85
Arrowwood Creek	4.07
Mill Creek	0.48
Glade Creek	15.00
Fallrock Branch	1.70
Brackens Creek	16.09
Laurel Creek	9.78
Kates Creek	0.96
Sewell Creek	18.11
Buffalo Creek	2.10

Kanawha River.

A brief description of the locks and dams and maximum and minimum river stages of the Kanawha River has already been given in Chapter I. This stream is the largest in Fayette County and is formed by the confluence of the New and Gauley Rivers at Gauley Bridge from which point it flows northwestward, crossing the Fayette-Kanawha County Line at Montgomery and emptying into the Ohio at Point Pleasant. As shown by the table on a preceding page, it drains directly 26.36 per cent. of the total area of the county, the other portion of Fayette being drained by New and Gauley Rivers, its largest two tributaries above Charleston. In a distance of 11.6

miles between Gauley Bridge and Montgomery, it has a total fall of 50 feet, or at the rate of 4.3 feet to the mile. However, 22 feet of the total of 50 is accounted for at the famous Falls of the Kanawha, slightly over a mile below the mouth of Gauley River. Here the river takes a sudden plunge over the Lower Nuttall Sandstone. The **Electro Metallurgical Company** has built a concrete dam on this ledge around the crest of the falls, 6½ to 7 feet high and 2000 feet long so that the original difference in pool levels here was only about 15 feet. The description of the latter company's plant at this point is given on a subsequent page under "Water-Power" in Chapter XII. From the Falls of the Kanawha to Montgomery the river descends at the rate of 2.1 feet to the mile, a figure that indicates an advanced stage in its erosive cycle, and the comparatively wide bottoms prevailing along both river banks signify that this stream has already begun its work of lateral erosion. The greater portion of its drainage basin above Montgomery within the State, including that of its tributaries—New and Gauley Rivers—is either heavily forested or cut-over territory, a feature that considerably retards the run-off from every heavy rainfall due to this sponge-like surface covering.

The principal tributaries of the Kanawha River below Gauley Bridge in Fayette are **Smithers Creek** from the north, and **Armstrong** and **Loop Creeks** from the south, interesting data on each of which, as regards rate of fall and area of drainage basins and other minor affluents, are given in the tables on a preceding page of this Chapter.

The U. S. Geological Survey in cooperation with the United States Engineer Corps maintains a gaging station at Lock No. 2 on the Kanawha River, just below Montgomery, the detailed records of which, as published in the Water-Supply Bulletins of the former, are given below.

The following data are taken from pages 56 and 57 of Water-Supply Paper No. 403 of the U. S. Geological Survey:

Kanawha River at Lock No. 2, Montgomery, W. Va.

"Location.—At Lock No. 2, three-fourths mile below Chesapeake & Ohio Railway station at Montgomery, Fayette County. Morris Creek enters on the left about 400 feet below the gage.

"**Drainage Area.**—8,470 square miles.

"**Records Available.**—June 22 to September 30, 1915. Upper and lower gages at the lock have been read to tenths daily at 8 a. m. since December, 1887, under the direction of the Corps of Engineers, United States Army.

"**Gage.**—Upper gage at lock, vertical and inclined staff on right bank, short distance above the upper lock gates. Vertical section fastened to right lock wall; inclined section is at upstream end of paved slope; read twice daily to hundredths by George Meyers, lockmaster, beginning June 22. A chain gage fastened on the downstream handrail near the center of toll bridge at Montgomery is used as a reference for the water surface at bridge for determining depths when it is not possible to sound section.

"**Discharge Measurements.**—Made from bridge at Montgomery or by wading on the crest of the dam.

"**Channel and Control.**—One channel at all stages; straight for 300 feet above and 800 feet below bridge. At bridge both banks high and do not overflow; at dam right bank never overflows, but left bank is low and flooded at high stages. Bed of river composed of rock, sand, and mud. The dam at Lock No. 2 is the control for practically all stages, as there is a fall of about 2 feet at the dam at the maximum stage. Except for the leakage through the dam and lock, point of zero flow is at lowest point in the crest of the dam, which is 17.9 feet above the zero of the upper gage.

"**Extremes of Stage.**—Maximum stage recorded since June 22, 24.62 feet at 6 a. m. September 7; minimum, 18.87 feet at 6 p. m. July 31. Highest stage recorded occurred May 23, 1901, at 6 a. m.; upper gage, 49.65; lower gage, 47.70.

"**Winter Flow.**—Discharge relation not affected by ice.

"**Diversions.**—None.

"**Regulation.**—None.

"**Accuracy.**—Records good.

"**Cooperation.**—Station maintained in cooperation with United States Engineer Corps.

"Estimates of daily discharge withheld."

Discharge Measurements of Kanawha River at Lock No. 2, Montgomery, W. Va., During the Years 1911 to September 30, 1915.

Date	Made by	Gage height. Feet.	Discharge Sec.-Feet.
1911			
February 8	Jackson and Bailey	21.60	12,800
February 13	H. J. Jackson	22.60	17,700
March 7	C. T. Bailey	27.24	53,100
March 10	C. T. Bailey	24.75	31,900
1912			
March 17	Horton and Bailey	30.96	86,700
1913			
March 28	A. H. Horton	39.0	157,000
1915			
June 19	Ellsworth and Conklin	20.91	9,310
July 27	C. E. Ellsworth	19.43	2,310

Discharge Measurements of Leakage at Lock No. 2, Kanawha River, at Montgomery, W. Va., During the Year Ending September 30, 1915.

Upper Gates.

Date	Made by	Gage height. Feet.	Discharge Sec.-Feet.
June 22.......	Ellsworth and Conklin...........	19.95	192
July 28.......	C. E. Ellsworth..................	19.36	166
	Lower Gates.		
June 22.......	Ellsworth and Conklin...........	20.00	110

Daily Gage Height, in Feet, of Kanawha River at Lock No. 2, Montgomery, W. Va., for the Year Ending September 30, 1915.

Day	June	July	Aug.	Sept.	Day	June	July	Aug.	Sept.
1	......	19.1	19.2	20.3	16	......	19.5	19.85	20.15
2	......	19.2	19.3	20.2	17	......	19.4	19.8	20.0
3	......	19.4	19.2	20.15	18	......	20.0	19.85	19.8
4	......	19.45	19.5	20.05	19	......	20.0	20.95	19.75
5	......	19.35	19.3	20.25	20	......	19.85	20.15	19.8
6	......	19.4	19.35	21.9	21	......	20.3	19.8	19.8
7	......	19.75	19.45	24.3	22	19.95	20.35	19.65	19.9
8	......	19.85	19.45	22.6	23	19.8	20.1	20.2	20.05
9	......	19.85	19.35	21.4	24	19.7	19.85	20.25	19.9
10	......	19.85	19.25	20.8	25	19.6	19.75	19.9	19.8
11	......	19.65	19.1	20.4	26	19.4	19.7	19.7	19.7
12	......	19.6	19.0	20.15	27	19.35	19.45	19.5	19.6
13	......	19.55	19.25	20.0	28	19.3	19.35	19.4	19.6
14	......	19.45	19.7	20.1	20	19.25	19.35	19.35	19.6
15	......	19.25	19.85	20.1	30	19.15	19.2	19.65	19.7
					31	......	19.05	20.2	......

New River.

New River, which unites with the Gauley to form the Kanawha at Gauley Bridge, has its source on the summit of Blue Ridge in the State of North Carolina and flows northward for over 200 miles to an intersection with the Virginia West Virginia State Line at the southern point of Summe County; and thence in a general northwest direction for 89 miles in West Virginia to its mouth at Gauley Bridge. From a point about one mile below Meadow Creek Station on the

C. & O. Railroad to slightly over a mile above McKendree, i forms the boundary line between Fayette and Raleigh Counties, but from the latter point to Gauley Bridge its course continues entirely in Fayette. From Radford, Virginia, to Hinton, West Virginia, it falls 370 feet in 105 miles, or at th rate of 3.6 feet to the mile. This figure is in marked contrast to that prevailing in Fayette County between Sewell and Gauley Bridge where in a distance of 18.5 miles there is a fall of 320 feet, or 17.3 feet to the mile, so that its course through the territory of this Report presents marked evidence of the youthfulness of its present valley whose floor is frequently less than 800 feet in width and 1200 to 1400 feet below the crests of its steeply sloping walls. While in the field gathering data for the Wyoming-McDowell County Report of the State Survey, published in 1915, the author made a special effort, without success, to find traces at a high level of an old channel of New River across that portion of the State, and also during 1916 in Fayette. The apparent youthful character of the valley of New River across the latter County, after a careful consideration of all the data in hand, is believed to be probably due to the fact that its course here is over the hard sandstone ledges of the New River and Pocahontas Groups of the Pottsville Series, a feature that should result in a much slower rate of channel cutting than would prevail to the southeast in Summers County in the softer rocks of the Mississippian.

As shown in the table on a preceding page of this Chapter, New River drains 326.4 square miles of Fayette, or 48.97 per cent. of the County, the balance being drained by the Gauley and Kanawha. Its possibilities for water-power are discussed on a subsequent page in Chapter XII.

Its principal tributaries in Fayette are **Mill, Keeney, Manns, Laurel** and **Meadow Creeks** from the northeast; and **Laurel, Wolf, Arbuckle** and **Dunloup Creeks** from the southwest. The rate of fall, area of drainage basins and other data concerning these and other minor affluents of New River are given in the tables on a preceding page.

As on the Kanawha, the U. S. Geological Survey maintains gaging stations on New River, one being located at

Fayette Station, Fayette County, the detailed records of which, as published in its Water-Supply Bulletins, are given below.

The following data are taken from pages 78-80 of Bulletin 140 of the U. S. Geological Survey:

"Fayette Station, on New River.

"New River above the Greenbrier was examined as far as the mouth of Bluestone River. Two ferries cross the river in this distance, but neither of these is equipped with cables. The section examined was about 1,000 feet wide except at the lower ferry, where it was 700 feet across. The width of the Greenbrier at its mouth is about 600 feet, and of the New just above the Greenbrier about 1,200 feet. At this point a ferry is located, but this does not have a cable. A series of long islands extends from this point down to the upper ferry above Hinton, W. Va., a distance of about a mile.

"At Hinton, on New River, 2 miles below its junction with the Greenbrier, the Weather Bureau has a gage. On this heights are read up to 10 feet by means of a rod fastened to a pier in the river, this being about 50 feet from shore at the time of low water. The heights above 10 feet are read on a rod fastened to a tree on shore. The pier in the stream consists of a wooden crib about 25 feet square and 10 feet high, filled with rock. There are no bridges across New River in this vicinity. This point is one of the widest places on the river, the width being about 1,900 feet. A cable ferry in constant use is located near the railroad station, and there is a second a mile above. It was considered impracticable to attempt river measurement at this point, and the inspection of the river was made down as far as Gauley. The first bridge, that of a small branch coal railroad running up Upper Loop Creek, is at Thurmond, W. Va., and crosses New River diagonally. The river has a restricted channel, and the velocity, especially at high water, is too great for accurate measurement.

"The next bridge, that at Fayette, W. Va., 47 miles below Hinton, is well located for measurements. It is a highway bridge of one span, having a total length of 261 feet. A gage was established here July 29, 1895, and a measurement of discharge subsequently made. The zero of the gage is opposite the south edge of the second vertical strut from the north end of the bridge, and is 5.20 feet from the pulley. The distance vertically of the zero to the bottom plate of the girder at the end of the first panel on the lower side is 55.06 feet. Two measurements have been made here, the first on July 29, when with a gage height of 4.07 feet the discharge was found to be 7,128 second-feet; the second on September 3, when the water stood at 1.71 feet and the discharge was 3,030 second-feet.

"The next bridge below Fayette, that of the Chesapeake and Ohio Railway at Hawks Nest, crosses the river diagonally, and the location is not favorable for measurement. At Gauley Junction an iron viaduct crosses New River about 2 miles above the mouth of Gauley River. The channel of the river is narrow and the velocity of the current too great for accurate measurement. Measurements of the Gauley could not be made from the railroad bridge crossing at its mouth owing to the ponding of the water under the bridge."

Daily Gage Height of New River at Fayette, W. Va., for 1895.

Day.	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	....	2.83	1.90	0.30	0.50	1.80
2	....	2.40	1.85	0.25	0.50	1.70
3	....	2.22	1.87	0.20	0.55	1.75
4	....	1.95	1.72	0.20	0.70	1.10
5	....	1.72	1.65	0.20	1.15	1.20
6	....	1.40	1.65	0.20	1.40	1.40
7	....	1.47	1.70	0.30	1.10	1.85
8	....	1.57	3.45	0.35	0.80	1.05
9	....	2.00	2.95	0.30	0.70	0.50
10	....	1.90	2.05	0.30	0.90	0.75
11	....	2.00	1.60	0.40	0.80	1.25
12	....	2.05	1.65	0.45	1.35	1.40
13	....	2.15	1.55	0.55	1.45	1.50
14	....	2.10	1.35	0.60	2.00	1.75
15	....	2.10	1.15	0.50	1.90	1.10
16	....	2.00	1.00	0.45	1.50	0.80
17	....	1.85	0.95	0.50	1.30	0.65
18	....	1.65	1.10	0.40	1.20	0.55
19	....	6.55	0.95	0.40	1.00	0.40
20	....	6.40	0.90	0.30	1.10	1.30
21	....	4.00	0.80	0.10	1.10	1.10
22	....	4.10	0.55	0.00	0.90	1.30
23	....	3.95	0.50	0.20	1.10	9.75
24	....	5.80	0.45	0.45	1.20	9.40
25	....	4.20	0.45	0.25	1.00	5.80
26	....	3.40	0.40	0.20	1.05	3.90
27	....	2.95	0.40	0.30	0.80	4.15
28	....	3.15	0.35	0.45	0.90	3.00
29	4.12	2.65	0.35	0.40	2.50	2.75
30	3.45	2.60	0.35	0.20	2.00	2.60
31	2.95	3.30	....	0.45	....	2.40

"Concerning the water resources of this region Prof. D. C. Humphreys[1] states that the largest power he has seen, and probably the finest in Virginia and West Virginia, is in the canyon of New River, where the fall is over 11 feet per mile and the distance about 64 miles. Taking the results of the smallest measurement, that of September 4, 1895, the total horse-power going to waste in the canyon is 440,000—sufficient to move about 550 trains, to do which with present mechanical appliances would require over 550 tons of coal per hour. This vast power is situated in the midst of one of the finest coal fields in the world, where steam production is cheap, so that the utilization of the water power may be postponed."

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[1] "Stream measurements and water power of Virginia and West Virginia," in Journal of the Association of Engineering Societies, November 9, 1895, page 187.

The following data are taken from page 41 of Water-Supply Paper No. 11 of the U. S. Geological Survey:

Daily Gage Height of New River at Fayette, W. Va., for 1896.

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.10	3.70	3.75	22.25	6.20	2.85	6.08	4.60	1.10	14.90	1.25	12.80
2	3.60	4.90	3.30	23.60	6.60	2.60	5.00	5.10	1.00	9.45	1.00	11.50
3	4.80	12.50	2.95	21.15	6.70	2.75	4.10	4.85	0.90	6.00	1.30	8.08
4	3.70	11.80	2.50	17.60	7.05	2.95	2.80	4.50	0.80	4.50	2.15	7.40
5	3.10	9.65	2.20	15.40	7.30	3.55	3.00	4.25	0.80	3.45	6.98	5.80
6	2.19	7.80	2.90	11.10	7.00	3.58	3.15	4.00	1.00	3.10	17.10	5.32
7	1.75	7.65	3.40	10.30	6.15	3.35	3.45	3.65	1.20	2.65	13.25	4.95
8	1.40	11.55	3.70	9.00	5.20	3.55	3.90	3.90	2.50	2.05	6.53	4.40
9	1.20	11.40	4.50	8.20	4.70	3.75	17.30	3.80	2.30	1.40	7.65	.....
10	1.90	8.65	4.00	7.10	4.55	4.00	25.20	3.60	2.00	1.90	6.30	.....
11	3.00	5.35	3.35	6.20	4.30	3.35	14.50	3.20	1.50	1.65	4.85	.....
12	2.75	4.15	3.70	6.05	4.05	3.00	14.00	2.95	1.25	1.70	3.00	.....
13	2.90	4.30	4.15	5.80	3.65	3.60	13.05	2.70	1.20	2.10	3.20	.....
14	2.40	7.90	5.00	5.50	3.30	3.00	12.00	2.10	1.15	2.80	3.50	.....
15	2.60	10.70	6.00	5.20	3.30	2.70	8.60	2.45	0.90	3.30	3.60	.....
16	2.30	9.00	11.00	5.05	3.40	2.50	7.15	2.40	1.40	3.00	3.55	.....
17	2.10	7.50	14.93	4.85	3.20	2.40	6.05	2.30	1.30	2.80	3.25	.....
18	1.95	5.00	15.75	4.70	3.05	2.60	5.00	2.05	1.23	1.95	2.90	.....
19	2.00	4.70	15.05	4.45	3.15	3.00	4.10	1.85	1.00	1.10	2.45	6.30
20	2.30	4.20	13.00	4.20	3.25	3.20	4.40	1.40	0.90	0.85	2.45	5.60
21	2.50	2.90	11.50	4.30	3.50	3.40	5.40	1.25	0.90	0.50	2.66	5.00
22	2.10	2.35	11.00	4.50	3.75	3.75	5.70	1.35	0.90	0.40	2.90	4.65
23	2.40	3.30	10.15	4.70	3.60	4.00	4.95	1.85	0.80	0.50	3.00	4.05
24	2.60	4.05	9.40	4.90	5.90	4.45	4.10	1.50	1.05	1.45	2.95	3.70
25	6.00	4.60	8.85	5.10	5.45	5.15	4.45	2.10	1.10	1.30	2.70	3.00
26	10.00	4.80	8.15	5.00	5.00	6.20	4.47	2.35	1.10	1.20	2.72	.....
27	8.10	4.20	7.50	5.30	4.10	8.90	4.20	2.70	1.10	1.00	2.70	2.60
28	7.55	4.00	6.60	5.45	4.00	7.90	4.30	2.40	1.10	0.70	3.10	2.75
29	6.70	3.90	7.40	5.80	3.55	7.53	4.50	2.15	0.70	1.40	7.45	2.90
30	4.90	.....	18.40	6.00	3.20	6.80	4.45	1.75	0.80	0.60	8.30	2.50
31	4.00	.....	23.40	.....	3.23	.....	4.85	1.30	.....	1.30	.....	2.70

"No observations December 9 to 17; wire gage broken."

The following data are taken from page 59 of Water-Supply Paper No. 15, "Operations at River Stations, 1897", Part I:

"Fayette Station on New River.

"This station, described in the Eighteenth Annual Report, Part IV, page 113, is located just below the mouth of Wolf Creek on a highway bridge of one span, at Fayette, West Virginia. The wire gage is located on the guard rail, on the upper side of the bridge about the middle of the span, and the graduation is to feet and tenths. Bench marks: The top of the bottom plate of the lower girder, at the end of the first panel from the left bank, lower side, is 55.13 feet above the zero of the gage; top of lower end of coping on the main pier, right bank, lower side, 52.13 feet above the zero of the gage; bridge seat, on the right bank, lower side, 54.58 feet above the zero of the gage;

west corner of abutment stone, by Chesapeake and Ohio Railroad station, 58.62 feet above the zero of the gage. The observer is M. W. Brellahan, agent, Chesapeake and Ohio Railway. The following discharge measurements were made by Prof. D. C. Humphreys and F. H. Anschutz in 1897:

"March 31, gage height, 5.50 feet; discharge, 9,587 second-feet.
"May 5, gage height, 8.50 feet; discharge, 15,931 second-feet.
"May 15, gage height, 13.98 feet; discharge, 35,195 second-feet.
"May 31, gage height. 3.70 feet; discharge, 5,145 second-feet.
"October 12, gage height, —0.18 feet; discharge, 1,136 second-feet.
"November 5, gage height, 1.72 feet; discharge, 2,616 second-feet."

Daily Gage Height, in Feet, of New River at Fayette, W. Va., for 1897.

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.80	1.90	7.20	6.00	4.30	3.25	2.25	4.07	1.20	0.10	1.40	0.40
2	2.30	2.05	6.65	5.50	4.30	3.60	3.15	3.25	1.10	0.05	1.55	0.45
3	3.00	2.20	6.35	5.05	7.80	3.65	3.55	2.85	1.05	0.05	1.80	1.15
4	3.30	3.05	6.05	5.90	9.52	3.50	4.52	2.40	0.95	0.01	1.90	1.25
5	3.60	4.30	6.15	6.95	9.25	3.33	4.50	2.50	0.90	0.00	1.75	1.25
6	3.20	6.50	6.50	7.10	7.48	3.30	4.10	2.90	0.65	0.00	2.00	1.05
7	3.50	16.72	7.25	9.80	6.50	4.70	3.73	2.80	0.50	0.05	2.40	1.10
8	4.00	14.10	7.40	11.10	6.20	5.00	4.75	2.75	0.45	0.10	1.50	3.75
9	3.50	8.60	7.70	7.80	5.25	5.95	3.80	4.60	0.40	0.10	1.30	3.00
10	3.35	6.03	12.05	8.10	5.15	6.55	3.50	4.05	0.35	0.05	1.25	2.95
11	3.00	6.40	16.00	9.75	4.75	6.22	3.45	3.00	0.35	0.00	1.20	1.85
12	2.90	9.20	11.70	8.50	5.95	5.25	3.85	2.50	0.20	0.00	1.00	1.20
13	2.35	13.70	14.00	8.00	6.12	5.00	3.50	2.25	0.00	0.00	0.80	1.15
14	2.05	14.70	15.20	7.15	20.58	4.60	3.05	2.10	0.95	5.56	0.70	1.30
15	2.30	14.00	17.40	6.45	16.10	3.55	2.40	2.00	0.80	2.95	0.70	1.80
16	2.10	13.25	16.80	6.10	11.00	3.40	1.90	1.60	0.75	1.85	0.70	1.70
17	2.45	10.10	15.70	6.30	8.20	3.80	2.00	1.30	0.90	1.05	0.60	1.75
18	2.75	9.90	13.00	6.05	7.50	3.50	2.25	1.25	0.90	0.90	0.55	3.50
19	3.00	9.00	14.10	5.80	6.55	3.10	2.25	1.35	0.90	0.70	0.45	3.40
20	3.45	9.25	12.30	5.45	5.70	4.40	2.45	1.40	0.50	0.60	0.40	3.20
21	4.00	20.10	11.40	5.15	5.35	4.85	2.90	1.80	0.50	0.45	0.40	3.00
22	4.50	26.12	10.30	4.85	5.00	5.25	5.50	1.90	0.50	0.50	0.35	3.40
23	4.70	27.55	9.60	4.50	4.65	5.38	8.10	1.85	0.00	4.05	0.20	5.25
24	4.00	23.18	9.20	4.20	4.10	3.95	11.48	1.75	0.50	2.35	0.10	3.85
25	3.80	18.30	8.70	4.10	4.00	3.40	10.00	1.75	0.50	1.50	0.15	3.10
26	2.90	11.55	8.25	4.00	3.85	3.25	9.50	1.85	0.65	1.10	0.25	3.10
27	2.30	8.15	7.00	3.85	3.30	3.08	8.20	1.80	0.75	1.05	0.00	2.40
28	1.95	7.80	6.70	3.70	3.30	2.57	7.85	1.90	0.80	0.95	0.05	2.40
29	1.60	.....	6.65	3.60	3.90	2.38	6.70	1.90	0.60	0.90	0.20	1.90
30	1.35	.....	6.40	3.50	3.78	2.35	5.30	1.60	0.30	0.80	0.20	2.10
31	1.60	.....	6.25	.....	3.70	.....	4.25	1.35	.....	1.10	.....	2.00

The following data for 1898 are taken from pages 62 and 65 of Water-Supply Paper No. 27 of the U. S. Geological Survey:

Daily Gage Height, in Feet, of New River at Fayette, W. Va., for 1898.

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.40	4.00	2.95	15.43	4.10	4.20	1.30	4.50	2.45	2.20	4.25	5.05
2	2.20	3.30	2.80	11.70	3.85	3.50	1.22	4.50	2.20	2.10	4.20	4.50
3	2.20	2.70	2.65	8.90	3.40	3.10	1.15	4.10	1.95	2.05	4.25	4.20
4	2.15	2.00	2.65	8.00	3.00	2.60	1.07	4.20	1.80	1.80	4.30	4.15
5	2.10	1.55	2.65	7.40	2.85	2.10	1.40	9.55	2.10	1.75	2.50	4.05
6	2.25	1.50	2.68	7.30	3.00	2.05	1.30	12.85	8.20	6.18	2.55	7.40
7	2.40	1.55	2.80	6.80	9.45	1.90	1.35	9.65	5.00	8.20	4.05	6.25
8	2.70	1.50	2.85	7.65	14.95	1.50	1.40	7.10	3.95	6.55	3.90	6.35
9	2.80	1.50	2.95	6.10	10.80	1.35	1.65	7.05	3.65	4.20	3.95	5.00
10	3.60	1.40	2.90	6.05	7.40	1.15	1.60	13.05	3.20	3.55	4.10	4.05
11	4.55	3.10	2.75	6.80	6.10	1.15	1.50	19.15	2.20	3.50	4.05	3.30
12	6.40	4.20	2.70	10.85	5.55	1.50	1.45	16.10	2.40	3.35	3.95	3.40
13	6.80	5.40	2.65	9.80	4.95	1.50	1.40	10.85	2.20	3.10	3.80	3.45
14	5.85	4.85	2.60	8.40	4.55	1.40	1.30	9.05	1.95	3.00	3.90	3.45
15	5.60	4.80	2.80	8.35	4.25	1.30	1.25	8.00	1.65	2.65	3.90	3.40
16	7.40	3.70	3.05	10.30	4.30	1.35	1.20	6.80	1.55	2.60	3.55	3.40
17	10.00	3.20	3.60	8.15	4.58	1.48	1.15	5.55	1.30	2.40	3.50	3.35
18	7.65	3.00	4.00	6.80	4.50	2.50	1.60	4.80	1.30	2.30	3.35	3.30
19	6.80	2.85	8.55	6.00	4.45	5.40	3.00	4.35	1.30	2.25	3.45	4.35
20	6.10	3.10	8.30	5.70	4.30	8.10	3.20	4.25	1.20	12.05	5.75	6.50
21	4.25	5.45	6.70	5.30	3.95	6.30	3.45	4.05	1.15	11.70	8.10	8.10
22	5.85	6.15	6.00	5.00	3.80	6.00	2.15	4.00	1.20	14.10	7.40	7.20
23	6.10	5.70	6.80	4.30	11.40	4.80	2.05	3.40	1.20	21.25	5.50	7.45
24	6.70	5.10	7.35	4.50	13.90	3.25	2.00	3.20	8.43	14.40	5.55	9.00
25	8.10	4.40	8.60	4.55	11.25	2.55	2.48	2.95	9.35	9.00	5.60	6.55
26	7.35	3.65	10.15	5.10	9.10	2.20	5.15	2.60	8.10	6.55	6.10	6.10
27	8.90	3.40	10.05	5.15	7.00	1.95	4.80	2.45	7.00	5.10	4.80	5.25
28	8.60	3.10	7.25	5.65	5.95	1.60	4.45	2.20	5.50	4.15	4.65	4.10
29	6.95	.....	10.00	4.60	5.45	1.55	4.60	3.15	4.65	3.40	4.60	4.00
30	5.40	.....	13.90	4.35	5.40	1.40	4.65	3.30	2.70	3.30	4.45	3.65
31	5.05	.....	17.85	.....	4.80	.....	4.60	3.20	.....	3.35	.....	5.10

List of Discharge Measurements of New River at Fayette, W. Va.

Date	Hydrographer	Gage Height	Discharge
1898			
June 15.......	D. C. Humphreys................	2.60	3,492
Aug. 5........	D. C. Humphreys................	9.15	19,027
Aug. 5........	D. C. Humphreys................	10.06	21,149
Aug. 6........	D. C. Humphreys................	13.02	31,533
Aug. 6........	D. C. Humphreys................	12.95	32,128*
Dec. 22.......	D. C. Humphreys................	5.94	10,902

* Approximate.

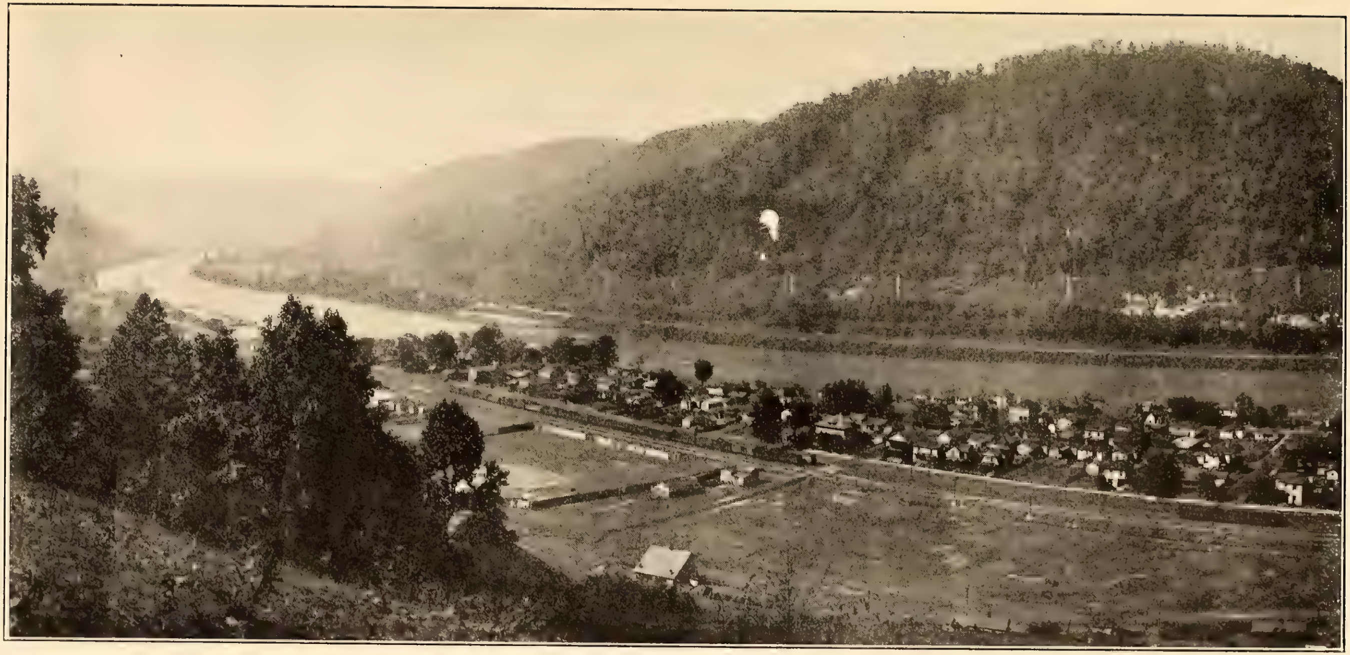

PLATE III.—View showing western end of Montgomery, U. S. Lock and Dam No. 2 on the Kanawha River, and topography of the Kanawha Group.

The following data for 1899 are taken from pages 164 and 165 of Water-Supply Paper No. 36 of the U. S. Geological Survey:

Daily Gage Height, in Feet, of New River at Fayette W. Va., for 1899.

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	4.45	4.45	9.00	8.40	6.80	6.30	3.80	2.40	2.70	0.95	1.80	0.80
2	4.30	5.00	11.51	8.35	6.25	6.35	3.00	2.30	1.55	0.80	2.00	0.85
3	4.10	6.40	19.35	6.50	6.00	6.00	3.20	2.20	1.50	0.80	1.95	0.80
4	4.10	7.25	35.08	6.10	5.85	5.50	3.05	2.40	1.90	0.70	1.85	0.70
5	4.00	14.20	29.78	5.50	5.70	4.95	2.40	2.25	2.20	0.60	1.80	0.55
6	5.90	20.60	24.43	5.85	5.75	4.60	2.45	2.15	2.10	0.65	1.75	0.50
7	13.00	22.80	18.78	7.50	5.65	3.15	2.25	2.00	2.00	0.50	1.75	0.50
8	10.10	17.10	14.00	8.10	7.55	3.25	2.20	1.85	1.40	0.50	2.40	0.45
9	6.50	14.35	13.30	7.10	12.40	3.20	2.10	1.40	1.30	2.05	1.65	0.35
10	5.20	10.05	10.10	7.05	12.10	3.05	2.05	1.45	1.35	2.40	1.40	0.80
11	8.10	8.30	9.50	7.15	8.10	3.05	1.95	1.35	1.45	2.35	1.20	1.00
12	7.50	6.50	9.00	9.80	9.95	3.00	1.90	1.30	1.40	2.65	1.20	1.00
13	7.40	6.10	8.20	8.00	8.25	6.85	2.05	1.35	1.30	2.60	1.15	1.70
14	6.45	5.30	8.00	7.55	8.90	11.60	1.85	1.40	1.30	2.60	1.10	9.50
15	6.15	4.50	8.40	7.00	10.70	11.75	1.45	1.50	1.25	2.45	1.10	8.30
16	5.80	4.30	8.25	6.75	9.50	10.30	1.35	2.10	1.20	2.40	1.05	4.60
17	5.50	4.45	10.50	6.65	8.00	7.05	1.30	2.70	1.15	2.30	1.05	3.25
18	5.05	6.50	10.10	6.00	6.60	6.00	1.40	2.15	1.20	2.15	1.00	2.95
19	4.75	6.85	15.00	5.55	5.95	5.30	1.35	1.45	1.20	2.10	1.00	2.80
20	4.35	6.20	20.00	5.55	5.65	5.05	1.40	1.40	1.15	2.10	1.00	2.85
21	4.10	9.40	17.60	5.50	5.20	4.35	1.80	1.30	1.10	2.05	0.90	3.05
22	4.20	11.25	11.40	5.40	5.05	4.10	1.90	1.25	1.15	2.05	0.90	3.10
23	5.55	10.10	8.30	5.40	5.00	3.50	1.75	1.25	1.10	2.00	0.90	3.15
24	5.40	9.50	8.00	5.30	4.85	3.20	1.50	1.10	1.05	1.85	0.95	3.00
25	4.90	8.60	7.55	5.25	4.60	3.20	1.45	1.05	1.15	1.80	1.00	3.40
26	4.85	8.95	6.40	5.40	4.50	3.10	1.45	0.95	1.30	1.70	1.10	3.80
27	4.85	20.05	11.10	8.50	4.10	3.05	1.40	0.90	1.20	1.70	1.10	4.10
28	4.60	14.65	15.00	8.70	3.90	3.30	1.30	0.90	1.20	1.60	1.05	4.40
29	4.50	.....	18.70	7.75	3.85	4.15	3.80	0.85	1.20	1.65	1.00	3.05
30	4.60	.....	14.10	7.10	3.80	4.05	3.00	0.80	1.20	1.70	0.85	2.90
31	4.50	.....	9.05	.....	4.30	.....	2.25	2.60	.....	1.60	.....	2.85

'The following measurements were made by D. C. Humphreys during 1899: June 22, gage height, 3.65 feet; discharge, 5,097 second-feet; August 14, gage height, 1.80 feet; discharge, 2,985 second-feet."

The following rating table for the Fayette Station on New River is taken from page 445 of Water-Supply No. 39 of the U. S. Geological Survey:

Rating Table for New River at Fayette, W. Va.

Gage Height in Feet.	Discharge in second-feet.	Gage Height in Feet.	Discharge in second-feet.
-0.4	.....	4.8	7,388
-0.2	.....	5.0	7,786
0.0	1,400	5.5	8,906
0.2	1,550	6.0	10,026
0.4	1,700	6.5	11,146
0.6	1,850	7.0	12,290
0.8	2,000	7.5	13,490
1.0	2,150	8.0	14,820
1.2	2,310	8.5	16,170
1.4	2,480	9.0	17,600
1.6	2,660	9.5	19,190
1.8	2,850	10.0	20,920
2.0	3,050	11.0	24,480
2.2	3,270	12.0	28,050
2.4	3,490	13.0	31,620
2.6	3,720	14.0	35,200
2.8	3,960	15.0	38,770
3.0	4,200	16.0	42,340
3.2	4,480	17.0	45,910
3.4	4,760	18.0	49,480
3.6	5,060	19.0	53,050
3.8	5,380	20.0	56,620
4.0	5,700	25.0	74,470
4.2	6,060	30.0	92,320
4.4	6,442	35.0	110,170
4.6	6,890	40.0	....

The following data are taken from pages 181 and 182 of Water-Supply Paper No. 48 of the U. S. Geological Survey:

"During 1900 the following measurements were made by D. C. Humphreys: March 31: Gage height, 8.49 feet; discharge, 17,387 second-feet. June 29: Gage height, 5.58 feet; discharge, 11,436 second-feet. July 25: Gage height, 2.47 feet; discharge, 4,625 second-feet. August 20: Gage height, 0.55 foot; discharge, 2,275 second-feet. December 21: Gage height, 3.40 feet; discharge, 5,915 second-feet."

Daily Gage Height, in Feet, of New River at Fayette, W. Va., for 1900.

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.95	3.95	7.80	8.30	4.50	4.30	6.60	3.00	0.90	1.10	3.50	(a)
2	3.20	3.60	12.50	7.50	4.40	3.60	6.15	2.20	0.90	0.95	3.70	(a)
3	3.40	3.55	8.15	6.90	4.10	3.30	5.30	1.40	0.90	0.80	3.00	(a)
4	3.10	3.50	6.40	6.50	4.00	3.00	4.00	1.00	0.80	0.80	2.80	(a)
5	3.10	3.40	5.55	6.20	4.00	4.00	3.10	0.70	0.80	0.75	2.65	(a)
6	3.00	3.45	4.05	5.70	3.95	3.50	2.70	0.50	0.70	1.10	2.90	(a)
7	3.05	3.30	4.10	5.40	3.85	3.30	2.90	0.25	0.70	1.10	3.25	(a)
8	3.10	3.05	3.80	5.00	3.85	3.00	2.10	0.10	0.70	1.45	3.40	(a)
9	3.40	3.00	3.50	4.85	3.90	2.65	1.80	0.10	0.60	1.70	3.80	(a)
10	3.60	3.20	3.45	4.95	4.00	2.50	1.45	0.00	0.75	1.80	4.00	(a)
11	4.10	3.40	3.90	4.75	4.50	2.40	1.10	0.90	0.80	1.60	3.75	(a)
12	4.44	4.05	4.05	4.40	4.60	2.20	0.90	0.60	0.85	1.35	3.60	(a)
13	6.20	4.20	4.00	4.25	4.25	3.45	0.80	0.30	0.75	1.40	3.45	(a)
14	5.45	11.25	4.00	4.30	3.85	3.60	0.70	0.20	0.90	2.05	3.35	(a)
15	5.30	9.60	5.10	4.20	3.55	3.50	0.60	0.10	0.80	2.25	3.10	(a)
16	5.00	7.05	5.75	3.80	3.25	8.20	0.60	0.10	0.00	2.00	3.00	(a)
17	4.70	3.40	5.85	3.60	3.15	10.40	0.60	0.20	6.15	1.85	2.70	(a)
18	4.40	3.55	6.20	3.40	2.90	11.00	0.50	0.20	7.80	3.05	2.50	(a)
19	4.30	4.10	7.85	3.80	4.50	10.50	0.80	0.10	6.00	3.20	2.40	(a)
20	5.45	4.05	10.40	10.20	4.45	8.50	0.90	0.30	5.40	2.95	2.30	(a)
21	8.75	5.10	13.60	8.50	4.10	6.80	0.90	0.20	5.05	3.15	3.10	(a)
22	6.40	5.40	12.30	8.00	4.60	6.30	0.75	0.40	4.60	3.15	4.40	(a)
23	4.40	7.30	9.90	9.80	4.10	6.00	0.50	0.40	4.30	2.90	5.80	(a)
24	3.25	6.55	7.45	9.30	3.50	5.80	2.10	0.50	2.85	16.05	6.60	2.50
25	3.60	5.60	5.95	7.85	4.00	5.60	2.70	0.70	2.50	18.10	.....	2.80
26	3.35	6.10	5.15	6.85	6.55	5.25	2.90	1.00	2.05	13.30	25.00	3.00
27	3.50	5.30	4.90	6.10	6.05	5.00	5.00	1.15	1.40	10.00	(a)	3.20
28	3.60	4.20	7.50	5.50	5.30	4.70	6.20	1.30	1.25	6.50	(a)	3.50
29	3.75	.....	9.65	5.00	4.60	5.50	6.50	1.50	1.15	5.00	(a)	3.90
30	4.20	.....	8.60	4.60	4.25	6.75	5.00	2.00	1.90	4.75	(a)	3.90
31	4.05	.....	8.50	.....	4.90	.....	3.80	1.40	.....	4.00	.....	4.10

a—Gage broken; no record.

The following **Rating Table** for New River at Fayette, West Virginia, is taken from page 515 of Water-Supply Paper No. 52, "Operations at River Stations, 1900", of the U. S. Geological Survey:

Gage Height in Feet.	Discharge in second-feet.	Gage Height in Feet.	Discharge in second-feet.
0.0	1,840	4.4	7,460
0.2	1,960	4.6	7,860
0.4	2,080	4.8	8,260
0.6	2,240	5.0	8,660
0.8	2,400	5.5	9,730
1.0	2,560	6.0	10.880
1.2	2,750	6.5	12.030
1.4	2.950	7.0	13,250
1.6	3,160	7.5	14,530
1.8	3,380	8.0	15.830
2.0	3,610	8.5	17,130
2.2	3,850	9.0	18,480
2.4	4,100	9.5	19,870
2.6	4,380	10.0	21,310
2.8	4,690	11.0	24,480
3.0	5,030	12.0	27,900
3.2	5,290	13.0	31,500
3.4	5,650	14.0	35,160
3.6	6,010	15.0	38.960
3.8	6,370		
4.0	6,730		
4.2	7,090		

The gaging station at Fayette, West Virginia, was discontinued May 22, 1901. During 1901 the following measurements were made by D. C. Humphreys, as given on page 294 of Water-Supply Paper No. 65 of the U. S. Geological Survey:

"March 27: Gage height, 7.54 feet; discharge, 16,813 second-feet.
"July 30: Gage height, 3.55 feet; discharge, 6,706 second-feet."

Daily Gage Height, in Feet, of New River at Fayette, W. Va., for 1901.

Day	Jan.	Feb.	Mar.	Apr.	May	Day	Jan.	Feb.	Mar.	Apr.	May
1	3.70	[illegible]	[illegible]	[illegible]	[illegible]	17	6.70	3.80	4.70	[illegible]	6.40
2	[illegible]	[illegible]	5.30	11.10	8.60	18	5.80	3.70	[illegible]	21.40	5.70
3	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	19	5.00	3.50	[illegible]	[illegible]	6.00
4	[illegible]	[illegible]	[illegible]	[illegible]	a7.10	20	4.00	3.20	3.50	[illegible]	6.80
5	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	21	[illegible]	3.00	[illegible]	[illegible]	[illegible]
6	[illegible]	[illegible]	[illegible]	[illegible]	6.00	22	3.10	3.10	3.10	25.50	20.65
7	[illegible]	3.90	5.10	[illegible]	[illegible]	23	3.00	3.20	3.00	[illegible]	.....
8	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	24	[illegible]	[illegible]	3.30	17.40	.....
9	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	25	[illegible]	3.50	[illegible]	[illegible]	.....
10	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	26	3.80	3.80	5.00	13.80	.....
11	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	27	4.30	[illegible]	9.20	[illegible]	..
12	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	28	[illegible]	4.40	9.00	12.80	.....
13	[illegible]	[illegible]	[illegible]	[illegible]	9.00	29	5.25	.....	8.70	11.40	.....
14	[illegible]	[illegible]	[illegible]	[illegible]	8.30	30	5.60	.....	8.10	10.50	.....
15	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	31	5.20	.....	7.40	....	.....
16	[illegible]	[illegible]	[illegible]	14.70	[illegible]						

a—Estimated.

The following data are taken from page 102 of Water-Supply Paper No. 75 of the U. S. Geological Survey:

Estimated Monthly Discharge of New River at Fayette, W. Va.

(Drainage area, 6,200 square miles.)

Month	Discharge in second-feet.			Run-off	
	Maximum	Minimum	Mean	Second-feet per square mile	Depth in inches
1901					
January	29,100	5,520	11,220	1.81	2.09
February	12,350	5,520	8,036	1.30	1.35
March	32,400	5.520	12,775	2.06	2.38
April-(a)... ...	107,740	14,946	41,855	6.75	7.53
May 1-22-(a) ...	60,430	11,100	17,700	2.85	2.33

a—Approximate from April 21 to May 4.

As stated on a preceding page, the gaging station at Fayette, West Virginia, was discontinued May 22, 1901, but was reestablished August 11, 1902, the zero of the new gage being at the same elevation as the zero of the old gage. The following discharge measurements were made during 1902 by D. C. Humphreys, as given on page 186 of Water-Supply Paper No. 83 of the U. S. Geological Survey:

"July 17: Gage height, 2.26 feet; discharge, 4,032 second-feet.
"August 14: Gage height, 1.10 feet; discharge, 2,022 second-feet."

The daily gage height, as read by the observer, Mr. M. W. Brellahan, for 1902, is given on page 186 of the last-mentioned Water-Supply Paper, as follows:

Daily Gage Height, in Feet, of New River at Fayette, W. Va., for 1902.

Day	Aug.	Sept.	Oct.	Nov.	Dec.	Day	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	0.28	0.81	1.30	4.35	17	0.80	0.05	1.50	0.59	8.96
2	.....	0.14	0.56	0.90	3.95	18	0.60	0.03	1.10	0.57	9.90
3	.....	0.22	0.59	0.71	6.30	19	0.78	0.09	0.40	0.72	8.39
4	.....	0.90	0.95	0.56	6.56	20	1.15	0.00	0.60	1.30	6.86
5	.....	0.18	1.10	0.32	6.95	21	1.35	0.03	0.56	2.80	5.50
6	.....	0.49	0.91	0.73	6.01	22	0.16	0.12	0.56	2.22	4.80
7	.....	1.28	4.30	0.71	6.15	23	0.25	0.18	0.20	1.65	4.68
8	.....	0.88	2.71	0.70	7.52	24	0.75	0.19	0.24	1.40	5.50
9	.....	1.10	1.85	1.31	4.72	25	0.70	0.35	0.29	1.50	5.00
10	.....	0.28	1.18	1.28	4.15	26	0.68	0.22	0.25	2.47	4.38
11	1.25	0.23	0.75	1.12	3.67	27	0.50	0.29	0.24	3.02	4.00
12	1.20	1.04	0.81	0.96	3.27	28	0.28	0.00	0.20	5.30	2.90
13	1.10	1.69	0.76	0.80	4.08	29	0.15	1.12	0.26	5.08	2.50
14	1.10	1.00	1.05	0.71	7.95	30	0.48	1.15	0.56	3.90	2.40
15	1.00	1.10	2.20	0.62	8.86	31	0.28	.....	1.60	.....	2.30
16	0.95	1.30	2.00	0.66	8.90						

The following **Rating Table** for New River at Fayette, West Virginia, for 1902, is taken from page 187 of Water-Supply Paper No. 83 of the U. S. Geological Survey:

Rating Table for New River at Fayette, W. Va., for 1902.

Gage Height Feet.	Discharge Second-Feet.	Gage Height Feet.	Discharge Second-Feet.	Gage Height Feet.	Discharge Second-Feet.	Gage Height Feet.	Discharge Second-Feet.
0.0*	600	4.0	7,400	8.0	17,148	15.0	39,960
0.2*	828	4.2	7,800	8.2	17,700	16.0	42,760
0.4*	1,068	4.4	8,200	8.4	18,300	17.0	46,560
0.6*	1,316	4.6	8,600	8.6	18,900	18.0	50,360
0.8*	1,576	4.8	9,040	8.8	19,500	19.0	54,160
1.0	1,842	5.0	9,480	9.0	20,100	20.0	57,960
1.2	2,104	5.2	9,930	9.2	20,700	21.0	61.760
1.4	2,529	5.4	10,390	9.4	21,300	22.0	65,560
1.6	2.887	5.6	10,850	9.6	21,900	23.0	69,360
1.8	3,235	5.8	11,350	9.8	22,500	24.0	73.160
2.0	3,581	6.0	11,850	10.0	23,100	25.0	76,960
2.2	3,933	6.2	12,350	10.5	24,600	26.0	80,760
2.4	4,293	6.4	12,850	11.0	26,100	27.0	84.560
2.6	4,669	6.6	13,350	11.5	27 600	28.0	88 360
2.8	5,053	6.8	13.850	12.0	29,100	29.0	92,160
3.0	5,439	7.0	14,398	12.5	30,600	30.0	95,960
3.2	5,827	7.2	14,946	13.0	32,100	31.0	99.760
3.4	6,216	7.4	15,494	13.5	33,600	32.0	103.560
3.6	6,608	7.6	16,044	14.0	35,160	33.0	107,360
3.8	7,004	7.8	16,596	14.5	37,080	34.0	111.160

*Discharge below 1 foot gage height is not well determined and must be considered as approximate.

The following data are also taken from page 187 of the report last mentioned:

Estimated Monthly Discharge of New River at Fayette, W. Va.

(Drainage area, 6,200 square miles.)

Month	Discharge in second-feet.			Run-off	
	Maximum	Minimum	Mean	Second-feet per square mile	Depth in inches
1902					
August 11 to 31	......	......	1,536	0.25	0.20
September	3,061	600	1,224	0.20	0.22
October	8,000	828	1,999	0.32	0.37
November	10,160	948	2,893	0.47	0.52
December	22,800	4,111	10,972	1.77	2.04

The data for 1903 are taken from pages 247 and 248 of Water-Supply Paper No. 98 of the U. S. Geological Survey. The observer was J. R. Durrett, a clerk in the store at Fayette, W. Va. On November 20, 1903, a standard chain gage was installed by W. C. Sawyer. It occupies the same position as the old wire gage, which it replaced, and it has the same datum. The length of the chain from the end of the weight to the marker is 59 feet. The observations at this station during 1903 were made under the direction of E. G. Paul, district hydrographer. In 1903 the following discharge measurements were made by E. G. Paul and W. C. Sawyer:

September 21: Gage height, 3.20 feet; discharge, 3,968 second-feet.

Mean Daily Gage Height, in Feet, of New River at Fayette, W. Va., for 1903.

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	6.10	8.02	21.60	9.90	11.20	5.70	7.70	6.70	1.75	1.35	1.30	0.20
2	8.40	7.03	15.00	9.70	9.85	6.10	6.40	7.70	1.75	1.25	1.45	0.10
3	17.20	7.45	12.10	9.50	9.80	5.65	5.55	7.40	1.80	1.25	1.55	0.00
4	15.10	11.60	9.00	8.60	9.15	5.30	5.75	5.90	2.85	1.35	1.45	0.90
5	7.60	17.70	8.00	6.30	9.10	5.80	5.65	6.30	1.80	1.25	1.55	1.00
6	4.30	11.10	6.70	5.80	10.25	6.20	5.30	6.50	1.75	1.25	1.45	0.95
7	4.80	9.30	6.30	7.10	9.10	9.50	5.05	6.80	1.85	1.35	1.85	0.90
8	4.10	8.00	8.10	10.10	9.20	9.00	5.00	6.60	1.95	1.45	1.55	1.00
9	4.00	7.20	9.00	12.90	9.81	7.95	4.80	5.80	2.15	1.55	2.05	1.10
10	3.75	6.40	11.30	9.80	9.90	7.70	4.80	5.50	2.05	3.65	1.50	0.90
11	3.60	5.40	11.00	8.70	9.70	6.80	4.85	3.30	2.95	3.05	1.25	0.75
12	3.10	8.30	10.80	6.60	9.20	6.45	6.20	3.05	1.85	2.75	1.55	0.55
13	3.15	11.00	10.30	5.50	9.05	6.35	8.65	2.95	2.15	2.65	1.45	0.30
14	2.90	9.20	9.50	9.00	8.75	6.75	9.85	2.85	2.05	2.45	1.40	0.15
15	2.80	10.20	9.30	11 20	8.00	6.65	10.70	2.95	1.95	2.05	1.65	0.10
16	2.85	11.40	8.00	10.10	7.95	5.85	10.00	2.35	1.80	1.75	1.55	0.10
17	3.40	12.20	7.60	8.70	7.75	5.85	9.30	2.15	2.05	1.55	0.95	0.05
18	3.55	17.20	7.50	8.10	7.90	4.50	7.10	2.05	2.20	1.20	.....	0.00
19	3.80	10.60	6.00	7.60	6.70	4.80	5.70	2.00	2.15	1.45	1.40	0.00
20	4.15	9.10	5.20	7.20	5.90	4.90	5.40	2.00	0.80	2.00	1.40	0.00
21	5.05	8.70	4.80	7.10	5.80	4.85	5.20	1.95	1.93	1.50	2.25	0.20
22	4.20	8.60	5.00	7.70	5.80	4.75	5.05	1.90	2.55	1.35	1.00	1.20
23	4.35	7.00	22.40	7.00	5.80	5.00	4.85	1.95	1.65	1.65	1.25	1.20
24	7.80	6.50	31.80	6.70	5.70	5.65	3.75	1.90	1.55	0.95	0.95	1.30
25	4.60	5.30	19.70	7.80	5.00	5.40	3.70	1.90	1.45	0.70	0.95	1.30
26	6.00	4.60	11.70	9.85	4.75	5.60	3.70	2.05	1.50	1.25	0.85	1.20
27	8.40	7.00	9.70	18.00	4.10	5.70	3.20	2.10	1.55	1.45	0.75	1.20
28	9.30	9.60	8.80	12.85	3.80	7.10	3.20	2.05	1.45	1.45	0.65	1.30
29	10.04	.. ..	8.10	11.90	3.75	11.40	3.80	2.00	1.35	1.35	0.25	1.45
30	13.01	.....	8.70	12.10	3.80	8.35	5.00	2.90	1.25	1.15	0.20	1.60
31	12.04	.....	10.10	.....	5.30	.....	6.30	1.80	.....	1.35	.....	1.60

The observations for 1904 were made under the direction of N. C. Grover, district hydrographer, by J. R. Durrett, a clerk in the store at Fayette. The station was again discontinued on December 31, 1904. The records for 1904 were published on pages 68-70 of Water-Supply Paper No. 128 of the U. S. Geological Survey, the daily gage height being as follows:

Mean Daily Gage Height, in Feet, of New River at Fayette, W. Va., for 1904.

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	1.60	1.20	8.00	4.20	7.20	3.80	8.33	2.59	0.55	–0.08	–0.31	0.05
2	1.90	1.10	9.50	4.80	6.10	5.00	7.17	1.81	0.75	–0.12	–0.25	0.05
3	1.90	1.60	8.20	5.30	5.20	9.30	4.65	1.60	0.75	–0.19	–0.23	0.10
4	1.90	1.50	7.50	4.80	4.70	9.50	4.04	3.12	1.60	–0.27	–0.04	0.15
5	1.80	2.00	7.00	4.20	5.00	7.40	3.42	2.70	2.25	–0.35	–0.04	0.25
6	1.90	2.40	6.10	3.70	4.50	5.90	3.01	3.40	1.75	(a)	–0.06	1.00
7	1.90	2.60	5.90	3.60	5.10	4.90	3.65	2.55	1.50	–0.41	0.05	1.88
8	1.60	4.40	10.00	3.40	4.50	4.30	3.10	3.41	1.10	–0.50	0.68	2.70
9	1.40	8.00	12.20	3.40	4.00	4.00	3.30	2.30	0.55	–0.54	0.86	2.69
10	1.00	7.00	9.20	3.40	4.00	4.10	2.86	2.20	0.65	–0.41	0.59	2.03
11	1.30	5.00	7.30	4.10	4.80	4.20	3.66	2.30	0.65	–0.45	0.31	1.85
12	1.30	3.70	6.40	3.80	5.20	4.00	3.97	2.40	0.40	–0.45	0.11	1.66
13	1.40	2.80	(a)	3.70	4.30	3.70	3.33	3.56	0.52	–0.37	0.09	1.36
14	1.20	2.10	5.70	3.50	3.80	4.40	2.55	3.16	0.40	–0.27	0.24	0.77
15	1.10	2.30	5.30	3.50	3.40	3.40	2.15	2.55	0.32	–0.37	0.32	0.73
16	0.90	1.70	5.20	3.60	3.30	(a)	1.60	2.10	0.38	–0.29	0.60	0.70
17	0.80	1.60	4.90	3.50	3.40	3.07	1.50	1.95	0.40	–0.37	1.23	0.00
18	0.70	1.60	4.40	3.40	3.80	3.11	1.45	1.56	0.35	–0.42	0.99	1.11
19	0.70	1.70	4.00	3.30	8.30	3.05	1.27	2.35	0.35	–0.42	0.75	0.55
20	1.00	1.70	4.00	3.10	13.30	3.10	1.02	2.00	0.25	–0.46	0.57	0.91
21	1.70	2.30	3.80	3.00	10.10	3.68	0.86	2.00	0.17	–0.14	0.44	0.95
22	2.00	5.10	3.70	2.70	(a)	3.50	0.81	1.75	0.04	–0.37	0.46	0.85
23	5.30	10.50	5.00	2.50	6.60	3.10	0.60	1.55	0.00	–0.42	0.50	0.73
24	9.90	9.20	7.30	2.50	6.10	2.82	1.27	1.55	0.00	–0.21	0.39	0.80
25	7.40	7.80	7.30	2.50	6.80	2.50	1.01	1.45	–0.04	–0.37	0.35	1.12
26	5.50	6.40	7.60	2.80	6.20	2.05	1.45	1.20	–0.05	–0.37	0.40	1.15
27	4.00	5.10	6.90	5.30	5.80	1.99	1.72	1.05	–0.06	–0.37	0.25	(a)
28	2.80	4.80	6.30	10.30	5.40	3.56	1.90	0.85	–0.15	–0.17	0.30	3.22
29	2.20	6.00	5.80	10.30	4.50	6.10	2.17	0.75	–0.08	–0.33	0.25	2.98
30	1.70	.....	5.10	8.60	4.00	6.15	2.30	0.65	–0.06	–0.20	0.08	2.72
31	1.40	.....	4.60	.....	3.90	.....	3.36	0.50	.....	–0.29	.....	2.37

a—Observer absent.

The estimated monthly discharge of New River at Fayette, W. Va., for 1904, as taken from page 70 of the Paper above mentioned, as as follows:

Estimated Monthly Discharge of New River at Fayette, W. Va., for 1904.

(Drainage area, 6,200 square miles.)

Month	Discharge in second-feet.			Run-off	
	Maximum	Minimum	Mean	Second-feet per square mile	Depth in inches
January	22,800	1,755	4,519	0.729	0.840
February	24,600	2,190	7,790	1.26	1.36
March	29,700	6,806	13,340	2.15	2.48
April	24,000	4,479	8,229	1.33	1.48
May	33,000	6,021	11,079	1.79	2.06
June	21,600	3,566	8,321	1.34	1.50
July	18,090	1,665	5,133	0.828	0.955
August	6,530	1,580	3,746	0.604	0.696
September	4,022	1,155	1,698	0.274	0.306
October	1,192	984	1,070	0.173	0.200
November	2,362	1,075	1,484	0.239	0.267
December	5,866	1,240	2,646	0.427	0.492
The year.....	33,000	984	5,754	0.929	12.64

NOTE.—The above estimate can only be considered as approximate. It is based upon the 1902 rating table with some modification below 2 feet gage height.

The station at Fayette, West Virginia, was reestablished July 16, 1908. The following data are from pages 75-76 of Water-Supply Paper No. 243:

"Its records furnish data for water-power, flood control, and storage problems. Wolf Creek enters on the right bank about one-eighth mile above the station; the drainage area above the section is about 6,800 square miles. (The previous tables have given the area as 6,200 square miles). The bed of the river here is rock, with large boulders on the bottom, which cause eddies and boils at high stages. The bottom has been carefully determined and by using standard soundings and care in making measurements the discharge can be determined with accuracy. The datum of the gage has remained constant during the maintenance of the station, but numerous errors have entered into many of the gage readings prior to 1908, particularly before the chain gage was installed November 20, 1903, the original wire gage being frequently many tenths in error. Owing to this cause and to the difficulty of securing accurate measurements at Fayette, all estimates of discharge heretofore published are only fair. Estimates of the discharge are withheld until sufficient measurements are obtained to develop a complete curve based upon recent measurements."

Discharge Measurements of New River at Fayette, W. Va., in 1908.

Date	Hydrographer	Width Feet	Area of section Sq. ft.	Gage height Feet	Discharge Sec.-ft.
August 13....	W. G. Hoyt.....	188	2,730	a3.24	4,530
August 14....	W. G. Hoyt.....	184	2,660	b2.59	4,030
September 19.	W. M. O'Neill..	175	2,360	1.32	2,430
September 21.	W. M. O'Neill..	177	2,440	c1.50	2,630
September 21	W. M. O'Neill..	175	2,400	1.24	2,460

a—Stage fell 0.5 foot during measurement.
b—Gage height doubtful.
c—Gage height is approximate.

Daily Gage Height, in Feet, of New River at Fayette, W. Va., for 1908.

Day	July	Aug	Sep.	Oct.	Nov	Dec.	Day	July	Aug	Sep	Oct.	Nov	Dec.
1	....	3.82	3.24	2.22	10.27	2.78	16.......	....	2.10	1.56	1.44	2.72	5.86
2	....	3.72	2.91	1.87	7.60	2.76	17.......	....	2.10	1.48	1.38	2.42	5.08
3	....	3.52	2.58	1.50	6.40	2.78	18.......	....	2.08	1.42	1.34	2.55	4.70
4	....	2.81	2.28	1.22	6.16	2.98	19.......	....	2.06	1.35	1.31	3.04	4.36
5	....	2.28	2.08	1.07	5.48	3.45	20.......	2.32	2.14	1.26	1.36	2.82	4.61
6	....	2.16	2.44	0.95	4.24	3.32	21.......	2.42	2.04	1.20	1.38	2.62	4.54
7	....	2.11	3.12	0.93	3.86	3.19	22.......	2.22	1.90	1.17	1.34	2.50	4.36
8	....	2.65	3.65	0.95	4.22	3.38	23.......	2.26	1.69	1.06	1.32	3.45	4.44
9	....	4.44	3.65	0.94	4.52	4.48	24.......	2.64	1.68	1.08	1.37	3.65	4.30
10	....	4.94	3.72	0.96	4.49	....	25.......	3.98	3.62	1.06	12.38	3.42	5.09
11	....	4.58	2.87	1.30	3.48	....	26.......	3.88	2.88	1.01	9.09	3.20	8.04
12	....	3.92	2.35	7.20	2.34	....	27.......	3.72	9.76	0.96	6.92	3.02	8.10
13	....	3.43	1.98	4.71	2.10	7.90	28.......	5.54	7.78	0.94	5.35	2.92	7.80
14	....	2.84	1.80	3.12	2.60	7.48	29.......	5.78	6.42	1.02	4.66	2.85	7.54
15	....	2.30	1.63	1.70	3.11	6.82	30.......	4.88	4.96	1.19	7.22	2.81	8.00
							31.......	4.08	3.70	....	11.36	....	11.02

The records of the Fayette Station for 1909 are published on pages 78 and 79 of Water-Supply Paper No. 263 of the U. S. Geological Survey, as follows:

Discharge Measurements of New River at Fayette, W. Va., in 1909.

Date	Hydrographer	Width Feet	Area of section Sq. ft.	Gage height Feet	Discharge Sec.-ft.
April 2.......	H. J. Jackson..	239	3,750	6.94	13,000
April 14......	H. J. Jackson..	258	4,070	a8.11	17,100
June 26......	H. J. Jackson..	207	3,110	4.24	6,820
November 20.	A. H. Horton...	173	2,540	1.30	2,660
November 20.	A. H. Horton...	173	2,540	1.30	2,680
December 1..	G. L. Parker...	172	2,500	1.10	2,390

a—Gage height rose 0.72 foot during measurement.

Daily Gage Height, in Feet, of New River at Fayette, W. Va., for 1909.

(John R. Durrett and A. E. Pierson, observers).

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	12.32	[illegible]	[illegible]	7.62	13.32	6.40	5.42	3.66	0.58	1.39	1.38	1.10
2	9.86	3.15	6.70	7.94	13.02	6.24	5.96	3.68	0.68	1.17	1.29	1.12
3	8.18	2.98	7.32	7.54	10.98	5.42	5.92	5.21	0.84	1.11	1.22	1.02
4	7.14	3.52	8.25	6.12	9.16	4.99	5.45	5.32	1.03	1.06	1.17	1.02
5	6.94	[illegible]	8.46	5.76	7.28	8.72	4.12	4.10	1.10	0.89	1.14	0.98
6	12.81	4.60	8.38	5.64	6.63	9.61	10.62	3.93	1.10	0.93	1.12	0.95
7	12.85	4.59	10.30	5.78	6.08	7.40	12.95	3.52	1.12	0.95	1.12	1.15
8	[illegible]	[illegible]	[illegible]	5.25	5.66	6.18	8.20	3.08	1.17	0.87	1.00	1.10
9	8.19	4.69	12.45	4.50	5.42	6.55	6.40	3.44	1.45	0.96	1.00	1.35
10	6.76	6.52	[illegible]	4.68	7.01	7.65	5.70	3.16	3.01	0.97	0.90	1.80
11	6.05	11.55	11.74	[illegible]	10.02	7.55	4.95	2.31	3.34	1.95	0.95	2.30
12	5.16	11.60	10.38	4.20	10.38	[illegible]	4.25	[illegible]	2.91	4.27	0.90	1.95
13	[illegible]	8.65	8.55	4.12	8.76	6.06	4.05	1.90	2.55	7.82	2.20	2.05
14	[illegible]	7.49	7.62	6.78	7.16	5.89	3.92	1.83	2.06	5.65	1.83	3.65
15	6.10	[illegible]	7.60	16.62	6.10	5.88	3.60	2.34	1.27	4.12	1.78	9.68
16	6.74	7.00	7.09	11.72	5.45	5.48	3.50	3.06	1.47	3.91	1.74	7.25
17	12.19	[illegible]	[illegible]	8.76	4.98	5.10	3.26	3.53	1.79	3.10	1.69	5.50
18	10.94	[illegible]	6.10	7.58	4.57	5.26	3.09	4.02	3.15	3.08	1.58	4.25
19	10.19	8.55	[illegible]	6.70	4.14	5.22	2.79	4.02	5.25	2.82	1.54	3.25
20	9.28	7.74	[illegible]	6.12	3.95	5.20	2.69	3.30	5.76	2.52	1.16	2.65
21	8.54	8.10	[illegible]	5.91	4.12	4.78	2.28	2.40	5.29	2.18	1.21	2.00
22	8.62	8.20	[illegible]	6.55	10.45	4.22	2.14	1.92	4.99	2.12	1.20	1.80
23	7.75	[illegible]	[illegible]	7.48	12.14	3.85	[illegible]	1.80	3.13	2.10	1.40	1.15
24	7.36	9.20	[illegible]	8.54	8.54	3.58	2.08	1.73	2.05	2.30	1.35	0.75
25	7.22	10.70	8.28	8.91	7.98	4.56	2.19	1.58	[illegible]	2.24	1.50	1.10
26	7.10	11.20	12.22	7.68	7.82	4.34	2.09	1.53	2.88	2.05	1.30	1.85
27	6.58	9.20	11.20	6.26	11.66	4.02	2.05	1.39	2.85	1.88	1.45	1.30
28	6.12	8.32	10.75	6.10	11.14	4.79	2.18	1.28	2.18	1.74	1.40	1.35
29	5.68	.....	10.90	7.70	8.86	4.84	2.19	1.08	1.86	1.66	1.60	1.35
30	[illegible]	.....	[illegible]	6.25	7.20	5.16	2.79	1.08	1.47	1.58	1.20	1.30
31	4.90	.....	9.20	.....	6.66	.....	3.32	0.97	.....	1.47	.....	0.70

The following data for the station at Feyette are taken from pages 68 and 69 of Water-Supply Paper No. 283 of the U. S. Geological Survey:

Discharge Measurements of New River at Fayette, W. Va., for 1910.

Date	Hydrographer	Width Feet	Area of section Sq. ft.	Gage height Feet	Discharge Sec.-ft.
March 7......	Horton & Bailey	228	3,730	6.88	13,000
March 7......	Horton & Bailey	228	3,730	6.90	12,900
March 28.....	C. T. Bailey....	182	2,820	2.68	4,340
June 18......	H. J. Jackson..	300	6,360	16.02	46,700
June 18......	H. J. Jackson..	295	5,900	14.68	40,900
June 19......	H. J. Jackson..	281	4,940	11.17	26,800
June 19......	H. J. Jackson..	278	4,800	10.72	25,200
June 20......	H. J. Jackson..	273	4,480	9.62	21,500
June 20......	H. J. Jackson..	273	4,320	9.05	19,300
October 12...	C. T. Bailey...	200	3,060	3.72	5,420

Daily Gage Height, in Feet, of New River at Fayette, W. Va., for 1910.

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	0.45	3.80	7.95	2.35	5.42	3.60	3.68	2.10	1.45	2.08	1.11	2.38
2	1.68	3.45	12.32	2.25	4.90	3.05	3.39	2.00	2.42	1.68	1.22	2.00
3	3.32	3.42	11.45	2.22	4.35	2.75	3.14	1.92	5.76	1.48	1.19	1.85
4	5.32	4.55	9.70	2.85	3.95	2.48	4.42	1.75	4.90	1.22	1.11	1.28
5	7.05	5.62	8.15	3.77	3.60	2.70	5.66	1.82	4.50	1.08	1.09	1.68
6	5.95	5.42	7.12	4.28	3.34	7.35	5.70	1.94	4.32	0.94	1.00	1.86
7	8.38	4.96	6.85	3.65	3.15	8.25	5.78	2.10	4.12	0.84	1.04	2.90
8	10.20	3.52	6.78	3.15	3.24	6.95	5.86	2.04	3.50	0.96	1.05	3.82
9	9.15	3.60	6.35	2.85	3.69	5.55	5.69	1.80	2.98	2.88	0.90	4.00
10	6.95	4.22	5.78	2.58	4.20	4.78	5.99	1.73	2.55	5.85	0.76	3.00
11	5.05	4.30	5.48	2.38	4.84	5.70	5.82	1.82	2.20	4.90	0.74	2.50
12	4.12	4.10	5.25	2.48	4.98	9.40	4.64	1.54	2.00	3.62	0.80	2.18
13	3.55	3.25	5.18	3.58	4.72	14.15	4.18	1.38	1.92	2.72	0.76	2.20
14	3.78	3.08	5.38	5.35	4.62	19.00	5.08	1.19	1.94	2.25	0.72	1.80
15	3.98	3.28	5.28	6.12	4.82	16.35	6.32	1.15	1.84	1.92	0.72	1.30
16	3.55	4.30	4.95	5.39	4.39	14.95	5.68	1.22	1.76	1.64	0.62	1.02
17	3.20	7.32	4.70	4.61	3.90	21.95	4.95	1.35	1.55	1.43	0.72	0.55
18	3.25	11.20	4.08	5.02	3.62	15.94	7.82	1.26	1.36	1.28	0.85	0.30
19	7.18	15.30	3.82	6.15	3.72	11.16	9.48	1.24	1.19	1.10	0.94	1.60
20	7.80	10.92	3.58	6.30	3.82	9.19	7.70	1.12	1.06	1.10	0.84	1.78
21	8.28	8.45	3.42	6.42	3.85	8.90	5.75	0.92	0.92	1.08	0.89	1.50
22	13.32	7.50	3.26	7.08	3.80	7.64	4.58	0.92	0.90	1.38	0.78	1.25
23	11.72	7.90	3.18	6.52	3.84	7.44	3.86	1.26	0.88	1.78	0.62	0.70
24	8.55	7.95	3.15	7.16	3.95	7.06	3.40	1.18	0.81	1.81	0.66	2.00
25	6.90	6.98	2.95	7.10	4.30	7.02	3.19	1.32	0.72	1.54	0.66	2.00
26	6.02	6.05	2.75	6.85	4.82	6.22	2.94	1.60	0.82	1.31	0.62	2.62
27	5.48	5.40	2.78	6.40	5.22	6.02	2.52	1.42	0.71	1.24	0.60	2.68
28	5.48	5.08	2.66	6.60	4.90	5.04	2.32	1.80	1.48	1.18	1.28	3.65
29	5.15	.....	2.55	6.46	4.22	4.42	2.18	1.40	1.98	1.18	1.90	3.58
30	4.48	.....	2.46	6.20	4.00	4.08	2.04	1.35	2.34	1.11	2.25	5.00
31	4.08	.....	2.39	.....	4.10	.....	2.00	1.22	.....	1.16	.....	9.62

The following data for the station at Fayette are taken from pages 40 and 41 of Water-Supply Paper No. 303 of the U. S. Geological Survey:

Daily Gage Height, in Feet, of New River at Fayette, W. Va., for 1911.

(A. E. Pierson, observer).

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	8.15	13.55	3.76	6.93	5.45	2.37	1.85	0.09	3.05	0.65	2.08	3.45
2	12.50	11.23	3.90	6.78	5.72	2.42	1.50	0.06	4.60	0.85	1.82	3.28
3	14.75	9.45	3.78	8.00	5.55	2.57	1.23	0.04	4.35	5.60	1.68	2.95
4	18.10	7.92	3.68	12.18	5.29	2.38	1.10	0.02	3.55	4.90	1.35	2.82
5	14.40	7.82	3.48	14.20	4.82	2.34	1.24	0.00	2.20	3.50	1.18	2.62
6	10.68	7.70	9.33	17.63	4.43	2.46	1.97	0.12	1.72	2.60	3.02	2.42
7	7.60	6.70	13.78	16.42	4.17	2.68	1.73	1.52	1.48	2.05	6.20	2.25
8	6.15	5.48	10.86	14.62	3.95	2.58	1.97	2.55	1.30	2.15	9.72	2.24
9	5.45	6.88	10.66	14.52	3.72	3.20	2.53	1.95	0.92	2.20	8.52	2.20
10	5.42	8.48	11.40	14.27	3.55	2.16	3.32	1.50	0.78	3.75	5.78	2.05
11	5.15	11.78	13.66	10.97	3.52	2.66	2.93	1.28	1.38	3.40	4.88	2.02
12	4.42	9.26	11.83	9.22	3.39	2.21	2.73	1.05	1.72	3.50	4.58	2.00
13	3.52	8.13	10.18	8.19	3.29	2.06	2.23	0.85	1.78	3.10	4.58	1.90
14	3.62	6.73	8.58	7.95	3.15	2.16	1.95	2.38	1.60	2.80	4.54	1.98
15	6.55	5.98	8.50	8.37	4.09	1.61	1.70	2.05	1.25	2.40	4.48	1.95
16	5.60	5.33	7.68	12.59	4.85	1.51	1.65	1.60	1.05	2.35	4.38	2.20
17	5.38	4.78	6.90	12.45	4.07	1.26	1.65	1.38	1.05	3.95	4.80	2.70
18	5.25	4.28	6.33	9.87	3.39	1.24	1.37	1.18	3.15	11.00	4.20	3.80
19	4.92	4.20	6.56	8.47	2.99	1.28	1.20	0.90	2.50	18.05	4.65	4.75
20	4.68	5.78	7.53	8.37	2.77	1.44	0.95	0.55	1.85	10.65	6.00	4.45
21	4.82	6.03	7.40	9.97	2.55	1.61	0.70	0.38	1.20	7.50	5.23	3.38
22	5.70	5.58	6.90	9.92	2.42	1.84	0.63	0.15	1.00	6.65	4.60	3.05
23	6.65	5.06	6.03	8.92	2.31	1.78	0.53	0.05	0.90	4.75	3.90	3.62
24	8.70	4.56	6.00	8.02	2.21	1.74	0.40	0.12	1.00	4.65	3.50	10.20
25	7.60	4.18	5.38	7.35	2.29	1.66	0.42	0.25	1.55	4.45	3.75	9.90
26	6.65	4.10	4.88	6.45	2.21	1.58	0.27	0.38	1.55	3.85	3.65	9.40
27	6.55	3.98	4.50	5.90	2.11	1.78	0.23	0.38	1.15	3.30	3.85	9.85
28	7.05	3.90	6.50	5.52	2.03	2.11	0.15	0.22	1.05	3.38	3.55	9.50
29	8.55	.....	7.42	5.35	1.81	2.04	0.05	0.30	0.90	3.55	3.65	9.15
30	16.35	.....	7.08	5.35	2.07	2.51	0.10	1.60	0.65	2.18	3.55	8.20
31	19.58	.....	6.93	.....	2.18	.....	0.03	1.85	.....	2.28	.....	7.30

NOTE.—No ice reported by the observer. Relation of gage height to discharge probably not affected by ice during 1911.

The following data for the station at Fayette during 1912 are taken from page 46 of Water-Supply Paper No. 323 of the U. S. Geological Survey:

Discharge Measurements of New River at Fayette, W. Va., in 1912.

Date	Hydrographer	Gage Height Feet	Discharge Sec.-ft.
March 26	C. T. Bailey	13.15	35,100
September 10	C. T. Bailey	0.48	2,070

"The elevation of the zero of the gage is 838.44 feet above sea-level.

"**Floods.**—The flood of 1878 reached a height of about 53 feet by the present gage datum."

Daily Gage Height, in Feet, of New River at Fayette, W. Va., for 1912.

(C. J. Henry, observer).

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	7.6	8.9	8.6	12.2	8.4	3.7	7.0	2.1	1.4	2.5	0.7	0.8
2	8.6	7.4	7.8	15.0	7.8	3.5	5.2	1.9	1.4	2.2	0.5	0.9
3	8.0	5.9	8.0	17.8	6.7	3.1	5.2	2.2	1.5	1.6	0.5	1.0
4	6.6	3.6	9.0	14.9	6.0	2.9	4.8	2.0	1.5	1.5	0.5	1.0
5	5.3	3.0	8.2	11.2	5.4	3.1	4.7	1.9	1.5	1.4	0.6	1.7
6	4.1	2.6	4.7	9.3	5.2	3.1	6.3	1.9	1.4	1.3	0.6	2.0
7	2.6	2.9	5.0	8.2	5.8	2.9	6.5	2.2	1.3	1.4	1.3	2.7
8	2.1	2.8	5.8	7.7	6.4	2.6	5.2	2.0	1.1	1.4	3.4	3.2
9	2.1	3.4	8.1	7.2	6.2	2.6	5.0	1.6	0.9	1.3	8.0	3.6
10	2.1	3.4	10.6	6.7	5.7	2.6	4.4	1.4	0.8	1.2	5.6	3.1
11	2.1	3.2	9.5	6.2	5.2	2.4	4.0	1.5	0.5	1.1	4.5	2.9
12	2.2	3.1	9.2	5.8	10.2	2.0	4.0	1.5	0.7	1.0	4.0	2.2
13	3.1	3.0	17.3	5.3	19.1	1.9	4.1	1.6	0.6	0.9	2.8	2.0
14	2.9	3.2	15.6	5.2	14.2	1.8	4.1	1.4	0.4	0.5	3.2	1.9
15	2.9	2.6	15.2	5.0	10.4	1.8	4.3	1.4	0.3	0.4	2.4	1.6
16	2.2	2.6	24.7	5.0	12.3	1.9	4.0	1.2	0.3	0.5	1.9	1.5
17	1.8	2.6	19.2	5.0	17.8	2.3	3.6	1.0	0.5	0.5	1.9	1.2
18	1.7	2.9	14.0	5.6	14.6	2.6	3.5	1.1	0.8	0.5	1.7	1.2
19	3.5	3.1	11.6	6.1	10.2	2.9	2.9	1.3	1.0	0.6	1.4	1.4
20	9.7	3.8	9.8	6.3	8.7	2.9	2.5	1.5	1.5	0.8	1.4	1.4
21	6.5	5.1	8.8	5.7	7.5	2.8	2.5	1.5	1.9	0.8	1.4	1.3
22	5.8	11.3	8.4	5.1	6.6	2.3	3.0	2.2	1.8	1.1	1.4	1.2
23	5.7	15.2	9.6	5.0	5.8	2.1	3.2	2.2	2.2	1.4	1.2	1.3
24	5.6	10.5	9.8	5.2	5.2	2.4	2.8	2.0	3.8	1.6	1.2	1.2
25	5.5	8.6	13.0	5.4	4.8	3.8	3.8	1.6	8.0	1.5	0.9	1.2
26	5.2	8.5	13.2	5.0	4.5	5.8	3.7	1.5	7.0	1.3	0.9	1.3
27	5.2	10.6	11.0	5.7	4.3	5.6	5.6	1.4	5.5	1.0	1.0	1.3
28	5.3	14.4	9.2	9.6	4.0	8.3	4.6	1.4	4.9	0.8	1.0	1.5
29	5.6	10.8	14.0	8.6	3.9	7.7	4.2	1.4	3.0	0.8	0.9	2.0
30	10.4	.....	23.2	8.6	3.6	6.0	3.4	1.2	2.7	0.8	0.9	2.2
31	10.4	.....	16.1	.....	3.7	.....	2.0	1.3	.....	0.8	.....	.....

NOTE.—Observer made no report relative to ice. Relation of gage height to discharge probably not materially affected by ice during 1912.

The following data concerning the station at Fayette for the year ending September 30, 1913, are taken from pages 49 and 50 of Water-Supply Paper No. 353 of the U. S. Geological Survey:

Discharge Measurements of New River at Fayette, W. Va., in the Year Ending September 30, 1913.

Date	Hydrographer	Gage Height Feet	Discharge Sec.-ft.
March 28......	A. H. Horton....................	a33.2	b147,000
June 19......	H. J. Jackson....................	3.10	4,690

a. ± 0.5 foot.

b. Velocities for this measurement determined by means of surface floats. A coefficient of 0.85 was used to reduce the observed velocities to mean velocities.

Daily Gage Height, in Feet, of New River at Fayette, W. Va., for the Year Ending September 30, 1913.

(C. J. Henry, observer.)

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	2.5	0.7	0.8	3.0	8.9	8.4	8.9	4.5	9.6	2.3	1.0	1.2
2	2.2	0.5	0.9	9.4	9.4	8.7	6.3	3.8	7.6	2.7	0.9	1.6
3	1.6	0.5	1.0	7.4	9.3	7.6	5.8	4.0	6.4	3.0	0.8	1.5
4	1.5	0.5	1.0	6.9	9.0	5.9	5.0	3.9	6.2	3.1	0.7	1.4
5	1.4	0.6	1.7	8.2	8.8	6.0	4.8	3.7	9.0	3.1	0.6	1.1
6	1.3	0.6	2.0	7.9	8.3	5.9	4.9	3.5	6.8	3.1	0.5	1.1
7	1.4	1.3	2.7	11.4	8.2	5.1	4.7	3.7	6.1	3.1	0.5	1.1
8	1.4	3.4	3.2	17.9	7.9	4.7	4.6	3.6	6.5	3.0	0.7	1.2
9	1.3	8.0	3.6	11.8	7.5	4.8	4.4	3.5	7.7	2.8	1.1	1.2
10	1.2	5.6	3.1	9.8	3.9	4.9	3.7	3.0	6.8	2.8	1.1	1.3
11	1.1	4.5	2.9	9.1	3.2	4.2	4.2	3.7	5.9	2.8	1.1	1.3
12	1.0	4.0	2.2	9.8	3.1	6.0	4.2	2.6	5.5	2.9	1.1	1.1
13	0.9	2.8	2.0	6.8	3.1	6.7	13.0	2.8	4.6	3.0	1.2	1.0
14	0.5	3.2	1.9	6.6	3.0	7.5	17.4	2.7	4.6	3.0	1.2	0.6
15	0.4	2.4	1.6	6.1	3.0	15.0	14.2	2.6	4.5	3.0	1.2	1.1
16	0.5	1.9	1.5	5.3	2.7	17.2	13.6	2.7	3.3	3.0	1.1	1.1
17	0.5	1.9	1.2	4.6	2.8	10.7	11.6	2.7	4.2	2.8	1.1	1.0
18	0.5	1.7	1.2	4.1	2.7	8.6	9.7	3.4	3.5	2.6	1.1	1.1
19	0.6	1.4	1.4	4.3	2.4	7.4	8.1	4.1	3.1	2.3	1.1	1.5
20	0.8	1.4	1.4	4.1	2.2	7.0	6.8	3.9	2.9	2.2	1.1	1.6
21	0.8	1.4	1.3	3.7	2.5	7.3	6.5	4.2	2.9	2.2	1.2	1.5
22	1.1	1.4	1.2	3.3	2.8	7.5	5.7	4.8	2.9	2.2	1.1	3.4
23	1.4	1.2	1.3	2.8	2.9	7.4	5.3	5.1	2.6	2.2	1.1	7.0
24	1.6	1.2	1.2	5.0	3.1	5.1	5.0	11.8	2.5	2.2	1.1	6.3
25	1.5	0.9	1.2	4.8	2.9	4.7	4.7	16.3	3.0	1.9	1.1	4.7
26	1.3	0.9	1.3	4.2	2.9	4.9	4.5	11.5	3.7	1.9	1.1	4.1
27	1.0	1.0	1.3	5.4	2.4	19.7	4.6	10.1	3.5	1.8	1.1	4.0
28	0.8	1.0	1.5	8.2	5.4	31.0	4.7	13.7	3.8	1.7	1.1	4.2
29	0.8	0.9	2.0	9.6	...	20.5	4.7	14.3	3.3	1.1	1.1	4.2
30	0.8	0.9	2.2	9.4	...	11.6	4.7	10.9	3.0	1.0	1.1	4.5
31	0.8	...	...	9.1	...	10.2	...	9.1	...	1.0	1.1	...

Note.—Observer made no notes concerning ice. Discharge relation probably not affected by ice during the year ending September 30, 1913.

The following data for the station at Fayette for the year ending September 30, 1914, are taken from page 48 of Water-Supply Paper No. 383 of the U. S. Geological Survey:

"**Gage.**—Standard chain gage attached to bridge; read daily, morning and evening, to hundredths. Limits of use: Half-tenths below and tenths above 0.

"**Discharge Measurements.**—Made from upstream side of bridge.

"**Extremes of Stage.**—Maximum stage recorded during year: 8.6 feet at 5 p. m. January 12; minimum, 0.10 foot at 5 p. m. September 30.

"The following discharge measurement was made by Peterson and Walters:

"November 15, 1913: Gage height, 6.05 feet; discharge, 10,400 second-feet."

Daily Gage Height, in Feet, of New River at Fayette, W. Va., for the Year Ending September 30, 1914.

(C. J. Henry, observer.)

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	3.8	2.0	6.7	3.9	5.2	5.0	5.5	5.1	5.0	1.2	4.3	5.1
2	3.9	1.1	6.8	3.9	5.2	4.9	5.6	5.1	4.8	1.1	4.4	5.0
3	4.0	1.2	7.0	4.0	5.5	4.8	5.6	5.0	4.7	1.0	4.4	5.0
4	4.1	1.3	7.0	5.3	6.0	4.7	5.5	5.0	4.7	0.9	4.5	4.9
5	4.2	1.4	6.5	6.8	6.1	3.8	5.4	4.9	4.5	0.8	4.6	4.8
6	4.1	1.4	7.3	7.4	6.3	4.0	5.3	4.7	4.4	0.8	4.9	4.8
7	4.2	1.5	7.4	7.9	6.3	5.1	5.2	4.7	4.3	0.9	5.0	4.8
8	4.4	1.5	7.4	8.0	5.4	5.2	5.0	4.6	4.2	0.8	5.1	4.8
9	4.8	1.6	7.3	8.1	4.1	5.8	4.8	4.4	4.2	1.1	5.2	4.7
10	5.2	1.7	7.1	8.2	4.1	6.0	4.8	4.3	4.1	1.2	5.2	4.6
11	5.4	1.7	6.9	8.3	4.0	7.0	4.8	4.1	4.1	1.2	5.4	4.5
12	5.9	1.8	6.3	8.5	4.0	7.1	4.7	4.1	4.1	1.4	5.5	4.5
13	6.1	2.2	6.0	8.4	4.1	7.2	4.7	4.3	4.0	1.0	5.6	4.4
14	5.2	4.5	5.5	8.4	4.2	7.1	4.6	4.5	3.8	2.1	5.6	4.4
15	4.8	7.3	5.8	8.3	4.8	7.0	4.6	4.4	3.7	2.3	5.7	4.3
16	4.3	7.4	7.7	8.1	5.8	6.9	4.5	4.2	3.6	2.6	5.7	4.2
17	3.6	7.4	8.3	7.9	7.1	6.8	4.5	4.2	3.5	2.7	5.7	4.1
18	2.5	7.3	8.0	7.8	7.1	6.7	4.5	4.2	3.4	3.2	5.8	4.0
19	2.1	7.1	7.8	7.1	6.9	6.6	4.4	4.2	3.4	3.5	5.8	3.8
20	1.8	6.9	7.0	7.3	6.3	6.4	4.4	4.5	3.3	3.7	5.9	3.7
21	1.4	6.3	5.1	7.9	5.9	5.9	4.3	4.6	3.2	3.7	5.9	3.3
22	1.2	6.0	3.1	8.0	5.7	5.8	4.2	4.6	3.2	3.8	5.9	3.0
23	1.1	5.5	3.1	8.0	5.6	5.6	4.1	4.6	3.1	3.9	6.0	2.8
24	1.1	5.4	3.1	8.0	5.4	5.4	4.1	4.8	3.1	4.0	6.0	2.3
25	1.0	5.1	3.0	7.0	5.2	5.3	4.2	4.9	3.0	4.1	6.6	1.9
26	1.6	5.1	3.0	5.2	5.2	4.9	4.2	5.0	3.0	4.1	6.5	1.7
27	1.8	5.1	2.9	5.1	5.1	4.8	4.4	5.1	2.8	4.1	5.9	1.5
28	2.0	5.0	2.8	5.1	5.1	4.9	4.6	5.1	2.7	4.2	5.8	1.2
29	2.4	5.0	2.7	4.9	...	5.1	4.8	5.2	2.6	4.2	5.7	0.6
30	2.2	6.6	2.6	4.9	...	5.2	4.8	5.2	2.4	4.2	5.7	0.2
31	2.0	...	3.5	5.0	...	5.2	...	5.2	...	4.3	...	...

Note.—Discharge relation probably not materially affected by ice.

The following data for the station at Fayette for the year ending September 30, 1915, are taken from pages 55 and 56 of Water-Supply Paper No. 403 of the U. S. Geological Survey:

"**Gage.**—Chain gage attached to bridge; read daily, morning and evening, to hundredths by C. J. Henry, George Stover, W. H. White.

"**Extremes of Stage.**—Maximum stage recorded during year, 38.0 at 7:30 a. m. January 8; minimum stage recorded, 0.4 foot October 7.

"**Winter Flow.**—Discharge relation little if at all affected by ice.

"**Diversions.**—None.

"**Regulation.**—There may be some regulation due to operation of power plants at or below Fries, Va.

"**Cooperation.**—Station maintained in cooperation with United States Engineer Corps.

"Estimates of daily discharge withheld."

Discharge Measurements of New River at Fayette, W. Va., During the Year Ending September 30, 1915.

Date	Made by	Gage Height Feet	Discharge Sec.-ft.
October 26..	Mathers and Morgan............	1.17	2,510
November 9..	Mathers and Morgan............	0.15	1,710
November 10.	Mathers and Morgan............	0.31	1,780
June 17......	Ellsworth and Conklin..........	3.78	6,210

Daily Gage Height, in Feet, of New River at Fayette, W. Va., for the Year Ending September 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1.........	0.0	1.0	1.2	10.2	9.3	6.9	4.1	5.1	3.5	0.5	0.4	3.9
2.........	0.0	1.3	4.4	9.4	18.2	6.3	4.1	5.9	3.8	0.9	0.3	3.6
3.........	0.0	1.0	8.7	8.8	[illegible]	5.4	4.1	5.9	4.0	1.2	0.6	3.4
4.........	–0.3	0.4	9.0	7.2	27.7	5.3	3.9	6.0	6.7	1.0	0.5	3.0
5.........	–0.3	0.5	9.6	5.6	18.2	5.6	3.7	5.6	7.4	0.7	0.4	2.6
6.........	–0.3	0.2	23.0	8.0	11.3	5.7	3.5	5.4	6.2	0.9	1.4	7.7
7.........	–0.4	0.3	14.2	29.5	10.6	6.0	3.6	5.7	4.8	1.4	1.6	11.7
8.........	+1.0	0.4	9.5	37.4	9.6	6.4	3.8	6.2	4.0	2.5	...	7.8
9.........	0.9	0.2	8.3	[illegible]	9.1	6.4	3.8	[illegible]	[illegible]	1.9	1.3	5.5
10.........	0.8	[illegible]	7.6	13.2	7.5	[illegible]	3.6	5.2	3.1	1.7	0.6	4.4
11.........	0.8	0.1	6.0	12.0	7.1	6.2	4.0	5.0	[illegible]	1.5	0.4	3.7
12.........	0.7	0.2	5.2	11.4	6.8	6.2	3.9	3.2	2.4	1.4	0.6	3.3
13.........	0.5	0.4	5.0	[illegible]	6.0	6.4	4.0	2.8	...	1.1	1.3	3.0
14.........	0.4	[illegible]	5.0	10.8	5.8	5.6	4.2	3.0	[illegible]	[illegible]	3.2	3.6
15.........	0.4	0.5	4.0	11.5	5.7	5.4	4.4	3.2	2.5	1.1	...	3.3
16.........	0.6	0.5	3.6	11.8	8.0	6.0	4.2	3.2	3.4	1.3	2.7	3.3
17.........	1.1	[illegible]	2.0	12.6	8.8	5.9	4.0	2.7	3.7	1.1	1.9	3.0
18.........	7.8	3.9	[illegible]	23.3	7.7	6.0	3.5	2.4	4.2	0.9	2.6	2.5
19.........	[illegible]	3.1	2.8	13.5	6.8	5.8	3.3	2.3	4.2	0.8	3.8	2.0
20.........	3.0	[illegible]	4.2	13.4	6.3	5.4	3.2	2.1	3.3	1.0	2.4	2.3
21.........	2.8	1.8	7.4	12.8	5.4	5.2	3.0	1.9	2.9	[illegible]	2.1	2.1
22.........	2.2	1.6	9.0	11.4	5.2	[illegible]	2.9	2.0	2.2	1.3	2.0	2.0
23.........	1.9	1.2	8.0	13.9	5.6	4.9	2.8	2.2	1.9	1.4	4.6	2.3
24.........	1.7	1.0	6.0	13.3	5.8	5.2	2.4	2.2	1.9	1.6	3.0	2.1
25.........	1.5	0.9	6.1	10.8	10.6	5.0	2.7	2.2	1.7	1.8	2.4	2.0
26.........	1.3	1.2	7.0	10.4	12.0	4.4	2.9	2.5	1.5	1.6	1.7	1.7
27.........	1.4	1.2	6.2	9.8	[illegible]	4.4	4.2	3.2	1.0	1.1	1.5	1.7
28.........	1.4	1.2	6.6	9.4	7.8	4.2	5.0	2.7	0.8	0.9	1.5	1.5
29.........	1.3	1.2	9.5	9.6	...	4.4	6.8	2.5	0.7	1.2	1.4	1.2
30.........	1.0	1.2	11.5	[illegible]	...	4.3	5.2	[illegible]	0.3	0.8	2.0	1.7
31.........	1.0		11.2	8.2	...	4.2	...	3.3	...	0.6	3.9	...

Gauley River.

Gauley River which unites with the New to form the Kanawha at Gauley Bridge has its source at the summit of Gauley Mountain near the common corner of Randolph, Webster, and Pocahontas Counties and flows in a general direction southwestward across Webster and Nicholas Counties to Carnifex Ferry at the mouth of Meadow River, where it forms the boundary between the latter county and the territory of this report westward to Belva. Here it suddenly veers to a south course in Fayette to its mouth at Gauley Bridge. From Carnifex Ferry to its mouth it flows in a picturesque gorge almost as deeply indented in the topography as that of New River, and between these points it meanders widely, the total distance measured by its channel being 2.1 times the air-line distance between the same points. It also has a rapid rate of fall as shown in the table on the preceding page, that between Carnifex Ferry and the mouth of Horseshoe Creek being 25.3 feet to the mile; between Horseshoe Creek and Belva, 11.5; and between Belva and Gauley Bridge, 10.9. The total area of its drainage basin, all included within the State, is 1435 square miles of which 164.43 square miles is included within Fayette County, only 34.67 per cent. of the latter area being drained by it and its largest tributary — Meadow River — in Fayette. Its possibilities for water-power development are discussed on a subsequent page in Chapter XII.

Its principal tributaries in Fayette are **Rich, Sugar, Horseshoe,** and **Laurel Creeks** and **Meadow River,** details concerning which and other minor affluents, as regards rate of fall, area of drainage basins, and meanders, are given in the tables on the preceding pages of this Chapter.

As on the Kanawha and New Rivers, the U. S. Geological Survey maintains gaging stations on Gauley and Meadow Rivers — three on the former and one on the latter. Those on the Gauley are located at Allingdale, Brock's Bridge, and Belva; and on Meadow River, at Russellville, the detailed records of the latter two, as published in the Water-Supply Bulletins of the U. S. Geological Survey, are given below.

The following data concerning the Gaging Station on Gauley River at Belva, West Virginia, are taken from pages 86 to 87 of Water-Supply Paper No. 243 of the U. S. Geological Survey:

Gauley River at Belva, W. Va.

"This station is located about one-half mile below Belva, W. Va. It was established August 25, 1908, to obtain data for use in studying water-power, water-supply, pollution, flood control, and storage problems.

"Twentymile Creek enters on the right bank about one-eighth mile above the station. The drainage area above the section is about 1,420 square miles.

"The gage datum has remained unchanged. The records are reliable and accurate. Sufficient data have not been obtained to enable estimates of the flow to be made."

Discharge Measurements of Gauley River at Belva, W. Va., in 1908.

Date	Hydrographer	Width Feet	Area of section Sq. ft.	Gage height Feet	Discharge Sec.-ft.
August 26....	W. G. Hoyt....	220	868	2.05	340
September 22a	W. M. O'Neill..	48	48	0.94	50

*a*Wading measurement.

Daily Gage Height, in Feet, of Gauley River at Belva, W. Va., for 1908.

(Observer, L. L. Davis).

Day.	Aug.	Sept.	Oct.	Nov.	Dec.
1........	.....	2.27	0.74	2.47	1.71
2........	.....	1.97	0.76	2.32	1.70
3........	.....	1.85	0.75	2.12	1.72
4........	.....	1.77	0.76	1.92	1.78
5........	.....	1.71	0.78	1.86	1.80
6........	.....	1.65	1.00	1.74	1.78
7........	.....	1.62	1.06	1.69	1.80
8........	.....	1.58	0.98	1.56	1.95
9........	.....	1.56	0.90	1.40	3.02
10........	.....	1.54	0.96	1.46	2.85
11........	.....	1.46	1.00	1.40	2.70
12........	.....	1.46	0.95	1.38	2.85
13........	.....	1.39	0.90	1.40	5.28
14........	.....	1.34	0.90	1.42	4.12
15........	.....	1.29	0.93	1.52	3.45
16........	.....	1.24	1.34	1.62	3.06
17........	.....	1.19	1.31	1.62	2.84
18........	.....	1.14	1.26	1.57	2.78
19........	.....	1.09	1.18	1.55	5.02
20........	.....	1.04	1.10	1.54	4.78
21........	.....	0.99	1.05	1.51	4.00
22........	.....	0.94	1.02	1.75	3.62
23........	.....	0.90	0.98	2.04	3.50
24........	.....	0.84	0.92	2.02	3.38
25........	.....	0.82	0.90	2.00	3.38
26........	.....	0.80	0.84	1.94	4.22
27........	1.99	0.78	0.82	1.89	4.25
28........	2.90	0.76	0.81	1.84	3.89
29........	2.54	0.74	1.49	1.78	3.60
30........	2.28	0.72	1.46	1.74	3.50
31........	2.17	.....	1.44	....	4.48

Note.—Gage heights September 13-22 have been interpolated by comparison of other Gauley River stations.

The following data concerning the Gaging Station on Gauley River at Belva, W. Va., for 1909, are taken from page 92 of Water-Supply Paper No. 263 of the U. S. Geological Survey:

> "Discharge measurements are made by means of a boat and cable, or by wading. A staff gage is fastened to a tree on the right bank about 1,000 feet below the gaging section. * * * *
>
> "The following discharge measurement was made by H. J. Jackson:
>
> "April 1, 1909: Width, 258 feet; area, 1,620 square feet; gage height, 4.98 feet; discharge, 3,990 second-feet."

Daily Gage Height, in Feet, of Gauley River at at Belva, W. Va., for 1909.

(L. L. Davis and C. L. Davis, observers.)

Day.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	5.50	3.50	4.87	5.08	7.60	3.06	4.32	2.29	1.26	1.84	2.58	2.56
2	4.63	3.70	4.46	4.72	8.00	2.85	5.55	2.34	1.21	1.78	2.48	2.52
3	4.06	3.52	4.34	4.74	6.75	2.71	4.65	2.30	1.19	1.69	2.45	2.50
4	3.78	3.43	5.32	4.90	5.82	2.72	3.80	2.25	1.15	1.62	2.46	2.47
5	3.58	3.48	5.49	5.32	5.21	2.78	3.30	2.14	1.50	1.56	2.39	2.45
6	6.34	3.89	5.18	5.74	4.76	3.22	3.34	2.02	1.35	1.50	2.30	2.42
7	6.20	4.90	6.15	5.54	4.30	3.28	5.11	1.89	2.08	1.44	2.24	2.39
8	5.30	4.84	7.58	4.94	4.12	3.00	4.70	1.80	1.92	1.39	2.21	2.40
9	5.06	4.49	7.05	4.40	4.68	2.80	4.00	1.71	1.88	1.32	2.34	2.60
10	4.04	6.48	8.30	4.10	4.54	4.25	3.50	1.65	2.02	1.29	4.24	2.68
11	3.76	7.22	7.96	3.82	6.85	4.71	3.08	1.69	2.28	1.38	4.82	2.45
12	3.60	5.97	6.38	3.54	5.98	4.65	2.78	1.74	2.81	1.36	4.26	2.48
13	3.70	5.30	5.60	3.48	5.22	4.00	2.74	1.69	2.61	3.55	3.74	2.68
14	3.48	5.38	5.90	7.00	4.62	3.72	3.30	1.64	2.32	2.86	3.38	4.54
15	6.49	5.52	6.00	8.08	4.12	3.82	3.41	1.62	2.10	2.52	3.14	5.30
16	8.50	7.55	5.44	6.40	3.77	4.41	3.11	1.63	1.94	2.36	2.94	4.52
17	7.64	8.38	4.94	5.40	3.48	4.21	2.86	2.58	3.70	2.38	2.82	3.96
18	6.45	6.75	4.25	4.74	3.22	4.22	2.66	3.08	2.90	2.46	2.72	3.58
19	5.45	6.36	4.05	4.29	3.00	4.52	2.65	2.75	2.51	2.32	2.62	3.25
20	4.82	5.83	3.92	4.26	2.88	3.85	2.55	2.46	2.30	2.26	2.52	2.90
21	4.52	6.15	3.68	5.05	2.81	3.40	2.43	2.27	2.12	2.55	2.44	3.01
22	4.42	6.52	5.70	7.30	2.82	3.18	2.34	2.12	1.98	2.40	2.40	3.12
23	4.34	6.42	5.45	8.58	3.45	3.11	2.52	1.96	1.88	2.36	2.40	3.55
24	4.46	6.02	4.92	8.05	3.08	3.45	2.68	1.86	1.80	2.46	2.55	3.35
25	4.42	6.90	5.24	6.70	2.89	3.78	2.85	1.76	2.42	4.00	2.90	3.32
26	4.17	6.29	7.58	5.73	2.88	3.58	2.80	1.68	2.71	3.57	2.82	3.30
27	4.12	5.76	7.01	5.14	4.00	3.12	2.56	1.59	2.38	3.38	2.68	3.15
28	3.92	5.34	7.76	5.20	4.17	3.38	2.42	1.52	2.18	3.25	2.58	3.00
29	3.77	....	7.72	5.48	4.05	3.30	2.35	1.45	2.06	3.05	2.51	2.88
30	3.90	....	6.52	5.46	3.70	3.51	2.40	1.38	1.95	2.86	2.50	2.72
31	3.75	....	5.70	....	3.35	....	2.35	1.31	....	2.70	....	2.62

Note.—Ice conditions the latter part of December. December 28, thickness of ice, 0.25 foot.

The following data for 1910 are taken from page 82 of Water-Supply Paper No. 283 of the U. S. Geological Survey:

Discharge Measurements of Gauley River at Belva, W. Va., in 1910.

Date	Hydrographer	Width Feet	Area of section Sq. ft.	Gage height Feet	Discharge Sec.-ft.
March 8......	Horton & Bailey	251	1,320	4.40	3,350
August 26....	C. T. Bailey....	90	107	1.95	a328

*a*Measurement not at regular section.

Daily Gage Height, in Feet, of Gauley River at Belva, W. Va., for 1910.

(C. L. Davis, observer.)

Day.	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1..........	2.62	3.88	6.85	2.68	4.12	3.28	3.56	2.56	1.65	3.00	2.58	4.45
2..........	2.86	3.55	7.10	2.61	3.82	3.34	3.22	2.38	1.76	2.88	2.54	3.90
3..........	5.55	3.75	6.55	2.60	3.58	3.74	3.08	2.26	2.38	2.76	2.59	3.52
4..........	8.60	4.80	5.75	2.62	3.41	3.53	4.12	2.34	3.14	2.52	2.78	3.41
5..........	6.60	4.82	5.15	2.85	3.30	3.65	5.20	2.18	3.65	2.35	2.62	3.35
6..........	5.54	4.48	4.80	3.39	3.16	7.22	4.58	2.11	4.12	2.22	2.71	4.12
7..........	8.72	3.85	4.58	3.18	3.04	7.30	4.28	2.05	3.70	2.14	2.64	4.38
8..........	7.80	3.62	4.38	3.10	3.06	5.92	5.26	2.02	3.19	2.12	2.59	3.86
9..........	6.00	3.60	4.00	3.02	3.58	4.95	5.04	1.96	3.85	2.62	2.54	3.50
10..........	5.18	3.88	3.76	2.92	4.88	4.82	4.18	1.94	3.32	3.51	2.48	3.28
11..........	4.38	4.22	3.74	2.84	4.56	5.26	3.66	1.92	2.82	3.12	2.38	3.27
12..........	3.95	4.12	3.68	2.89	6.28	5.69	3.38	1.88	2.62	2.88	2.35	3.26
13..........	3.71	3.92	3.62	3.40	7.85	6.60	5.90	1.80	2.68	2.57	2.31	3.00
14..........	3.94	3.68	3.73	4.63	6.19	6.56	6.02	1.75	4.00	2.42	2.26	2.90
15..........	4.52	3.65	3.90	4.27	5.18	6.36	5.62	1.98	4.00	2.26	2.24	2.85
16..........	4.24	4.20	3.71	4.03	4.51	9.50	4.52	2.00	3.34	2.20	2.22	2.80
17..........	3.92	6.40	3.54	3.82	4.00	12.95	4.20	1.90	2.92	2.12	2.25	3.08
18..........	4.50	8.30	3.48	4.26	3.86	8.18	3.94	1.78	2.65	2.08	2.21	3.05
19..........	8.75	7.21	3.29	4.85	4.02	6.50	4.11	1.74	2.52	2.01	2.18	2.82
20..........	7.12	6.11	3.11	5.01	3.88	6.25	4.01	1.71	2.38	1.96	2.08	3.40
21..........	6.82	5.38	3.08	6.00	3.84	5.15	3.60	1.70	2.29	1.90	2.04	4.08
22..........	8.17	4.88	3.14	7.22	4.10	5.40	3.24	1.65	2.25	1.90	2.01	3.90
23..........	6.42	6.48	3.18	6.95	4.13	4.80	2.95	1.62	2.18	1.98	2.05	3.50
24..........	5.55	5.90	3.02	7.58	4.00	4.32	2.75	1.60	2.08	2.61	2.04	4.30
25..........	4.92	5.24	3.06	7.07	4.75	3.88	2.56	2.05	2.01	2.45	2.09	5.45
26..........	4.45	4.58	2.99	6.12	4.55	3.52	2.50	2.00	3.78	2.26	2.49	4.65
27..........	4.58	4.20	2.98	5.38	4.15	4.11	3.25	1.81	3.98	2.18	3.12	4.18
28..........	5.26	4.08	2.90	5.10	3.77	5.15	3.12	1.72	3.90	2.29	3.20	3.82
29..........	5.08	....	2.84	4.72	3.50	4.75	3.10	1.64	3.89	2.62	5.38	4.05
30..........	4.15	....	2.79	4.49	3.33	4.02	2.86	1.60	3.32	2.82	5.26	10.08
31..........	4.15	....	2.74	....	3.29	....	2.62	1.61	....	2.66	....	8.65

Note.—Relation of gage height to discharge affected by ice about Dec. 16 to 23. Jan. 12, Feb. 8, and Dec. 17, observer reported ice along shores.

The following data for 1911 are taken from pages 54 and 55 of Water-Supply Paper No. 303 of the U. S. Geological Survey:

"**Channel.**—Coarse gravel; practically permanent.

"**Discharge Measurements.**—Made from a boat 1,000 feet above gage or by wading.

"**Floods.**—No records of floods previous to installation of gage are available. Maximum gage height since installation of gage was approximately 19 feet January 30, 1911.

"**Winter Flow.**—Relation of gage height to discharge may be affected by ice at intervals during December, January, and February."

Discharge Measurements of Gauley River near Belva, W. Va., in 1911.

Date	Hydrographer	Gage Height Feet	Discharge Sec.-ft.
October 15...	Bailey and Perwien..............	4.37	2,830
October 16...	Bailey and Perwien.............	6.50	6,730

Daily Gage Height, in Feet, of Gauley River near Belva, W. Va., for 1911.

(C. L. Davis, observer).

Day.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1.........	7.25	8.25	3.80	4.92	3.80	2.10	2.34	1.48	2.66	2.45	2.65	4.30
2.........	9.95	7.78	3.68	4.78	3.70	2.92	2.12	1.38	2.92	2.68	2.55	3.98
3.........	10.95	6.78	3.58	4.78	3.70	2.68	1.96	1.31	2.52	5.42	2.49	3.75
4.........	9.10	6.02	3.35	6.62	3.60	2.38	1.88	1.22	2.25	4.58	2.36	3.55
5.........	7.10	5.45	3.35	8.95	3.45	2.25	2.10	1.18	2.62	3.89	2.31	3.22
6.........	5.72	4.95	6.10	9.30	3.20	2.42	2.00	1.09	2.42	3.42	2.84	3.00
7.........	5.01	4.62	10.00	7.41	3.12	2.58	1.90	1.04	2.42	3.12	6.18	3.02
8.........	4.48	4.35	8.42	6.35	3.02	2.40	1.92	1.12	2.32	4.88	6.20	3.00
9.........	4.12	4.60	6.70	7.08	2.98	2.24	2.88	1.76	2.20	4.30	5.12	2.95
10.........	3.75	5.22	6.05	7.05	2.92	2.08	2.41	2.05	3.30	3.30	4.45	2.92
11.........	3.55	4.96	6.00	6.22	2.86	1.98	2.30	1.98	3.12	4.42	3.95	3.01
12.........	3.65	4.61	5.70	5.51	2.82	1.88	2.60	1.75	3.58	5.00	3.65	3.05
13.........	7.28	4.36	5.39	5.08	2.72	1.88	2.70	1.65	3.38	4.68	4.08	3.10
14.........	9.68	4.05	5.95	4.92	2.58	2.70	2.58	1.58	3.08	4.15	4.45	3.10
15.........	7.76	3.72	5.82	7.00	2.49	2.50	2.28	1.50	2.82	4.20	4.22	3.05
16.........	8.65	3.58	5.08	6.55	2.42	2.34	2.08	1.52	4.60	6.39	4.00	3.30
17.........	6.95	3.38	4.62	5.82	2.35	2.20	1.95	1.68	4.80	5.28	3.70	4.08
18.........	5.80	3.28	4.00	5.38	2.34	2.20	1.82	1.85	4.00	9.55	3.85	4.38
19.........	5.00	3.33	4.31	4.68	2.30	2.18	1.72	1.92	3.34	7.88	5.38	4.02
20.........	4.56	3.90	6.30	5.42	2.24	2.34	1.70	1.78	3.04	6.05	5.18	3.75
21.........	4.50	4.34	5.85	6.85	2.19	2.40	1.70	1.65	2.90	5.00	4.61	3.55
22.........	7.32	4.10	5.75	6.72	2.14	2.28	1.70	1.56	3.12	4.25	4.14	3.50
23.........	7.28	3.96	5.50	7.28	2.09	2.12	1.62	1.45	3.08	4.02	3.78	3.92
24.........	6.12	3.72	5.15	6.58	2.02	2.00	1.68	1.34	2.88	4.30	3.65	5.42
25.........	5.42	3.52	4.62	5.72	2.15	1.88	1.68	1.28	2.62	3.88	4.05	5.35
26.........	5.38	3.50	4.35	5.15	2.25	2.04	1.65	1.18	2.40	3.56	4.25	5.25
27.........	8.48	3.50	4.25	4.66	2.12	2.25	1.78	1.14	2.28	3.35	4.15	5.75
28.........	7.72	3.58	4.72	4.24	2.02	2.30	1.80	1.11	2.19	3.17	4.18	6.35
29.........	7.80	....	4.42	4.00	1.99	2.65	1.72	1.08	2.25	2.96	4.54	5.72
30.........	16.00	....	4.40	3.85	2.18	2.55	1.62	1.18	2.48	2.86	4.68	4.92
31.........	10.55	....	4.88	....	2.15	....	1.54	1.58	....	2.76	....	4.70

Note.—Observer made no notes concerning ice. Relation of gage height to discharge probably not affected by ice during 1911.

The following data for 1912 are taken from pages 59 and 60 of Water-Supply Paper No. 323 of the U. S. Geological Survey:

Discharge Measurements of Gauley River near Belva, W. Va., in 1912.

Date	Hydrographer	Gage Height Feet	Discharge Sec.-ft.
April 2	C. T. Bailey	6.16	[a]6,460
September 11	C. T. Bailey	2.12	[b] 342

[a] At Kanawha & Michigan Railroad bridge 5 miles below gage; increase in drainage area about 1 per cent.

[b] Wading measurement.

Daily Gage Height, in Feet, of Gauley River near Belva, W. Va., for 1912.

(C. L. Davis, observer).

Day.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	6.3	5.8	5.4	6.4	5.6	2.4	3.5	4.6	4.0	2.95	2.55	2.2
2	5.6	5.2	4.6	6.6	5.2	2.4	3.1	4.3	3.4	2.8	2.55	2.35
3	5.0	4.6	4.3	8.3	4.8	2.3	2.8	3.7	3.1	2.65	2.6	2.5
4	4.6	4.0	4.0	7.2	4.4	2.25	3.3	3.3	2.85	2.5	2.5	3.4
5	4.1	3.6	3.8	6.2	4.0	2.2	4.0	2.95	3.0	2.4	2.4	4.4
6	3.6	3.3	3.6	5.4	3.9	2.2	4.2	2.75	2.8	2.3	2.4	5.4
7	3.7	3.4	3.5	4.9	4.5	2.1	3.8	2.55	2.65	2.2	3.5	5.6
8	4.3	3.7	3.45	5.2	5.6	1.98	3.25	2.45	2.5	2.1	9.1	5.2
9	4.7	3.8	4.0	5.1	5.5	1.91	2.95	2.4	2.4	2.05	6.8	4.6
10	4.7	3.8	5.0	4.8	5.0	1.86	3.0	2.35	2.2	2.0	5.3	4.2
11	4.5	3.7	5.1	4.4	4.5	1.81	3.4	2.3	2.1	1.95	4.4	3.8
12	4.3	3.4	5.2	4.1	9.0	1.72	4.0	2.4	2.05	1.91	4.1	3.6
13	4.0	3.1	7.5	3.8	9.4	1.62	3.5	3.4	1.98	1.85	3.9	3.2
14	3.9	2.85	7.7	3.7	7.4	1.60	3.0	3.15	1.88	1.82	3.6	2.75
15	3.8	2.8	10.3	3.5	6.6	1.54	2.85	2.7	1.85	1.78	3.6	3.1
16	3.8	2.7	13.8	3.6	9.0	1.48	4.0	2.45	1.78	1.71	3.4	3.05
17	4.1	2.7	9.1	4.3	10.2	1.45	3.8	2.3	1.74	1.75	3.1	3.0
18	4.2	2.7	7.1	4.6	7.8	1.55	7.4	2.2	1.75	1.78	3.0	2.9
19	4.9	2.9	6.2	5.2	6.5	2.3	7.3	2.45	1.88	1.78	2.95	2.9
20	6.8	3.3	6.3	4.8	5.5	3.4	5.5	3.25	1.95	1.72	2.9	2.9
21	5.5	4.4	7.2	4.4	4.8	3.4	4.2	4.0	1.9	3.0	2.85	2.7
22	4.8	7.8	7.2	4.1	4.3	2.9	3.5	4.6	1.9	2.7	2.8	2.55
23	4.2	6.8	6.4	4.4	3.8	2.55	4.3	4.0	2.75	2.55	2.7	2.4
24	4.0	6.0	6.8	4.5	3.5	2.6	3.7	3.4	3.7	3.5	2.65	2.6
25	3.8	5.2	9.0	4.3	3.2	2.9	6.8	3.0	4.1	4.4	2.6	2.5
26	3.6	6.4	7.4	4.0	3.1	3.0	7.6	2.9	3.8	3.7	2.6	3.15
27	3.6	12.2	6.3	4.2	3.0	3.5	5.9	3.5	3.5	3.4	2.6	2.65
28	3.5	8.4	5.4	4.8	2.8	5.6	5.2	3.25	3.6	3.15	2.5	3.0
29	3.6	6.6	7.4	4.8	2.7	5.0	4.2	3.9	3.3	2.95	2.4	3.4
30	7.0	...	8.8	5.1	2.6	3.9	4.4	6.5	3.1	2.75	2.3	4.5
31	7.0	...	7.8	...	2.5	...	4.6	4.8	...	2.6	...	9.2

Note.—Relation of gage height to discharge probably affected by ice Jan. 7-19 and Feb. 7-18. Observer reported as follows: Jan. 16, river entirely frozen over; ice about 4 inches thick, control partly frozen; Jan. 20, no ice; Feb. 4, river open in middle, ice along shore 2 inches thick, control open; Feb. 11, ice along shore 4 inches thick, ice broken up at control; Feb. 21, no ice.

The following data for the year ending September 30, 1913, are taken from page 63 of Water-Supply Paper No. 353 of the U. S. Geological Survey:

> "**Gage.**—Vertical staff fastened to tree on right bank; read daily, morning and evening, to hundredths. Limits of use: Hundredths below 2.0, half-tenths from 2.0 to 3.5; and tenths above 3.5 feet. Sea-level elevation of the zero of the gage, 663.53 feet.
>
> "No discharge measurements were made at this station during the year ending September 30, 1913."

Daily Gage Height, in Feet, of Gauley River near Belva, W. Va., for the Year Ending September 30, 1913.

(C. L. Davis, observer).

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	2.95	2.55	2.2	6.9	5.2	5.4	4.9	5.0	6.4	2.55	2.3	1.99
2	2.8	2.55	2.35	5.6	5.4	5.1	4.4	4.6	5.4	2.65	2.25	1.92
3	2.65	2.6	2.5	5.3	5.4	4.7	4.1	4.2	4.5	2.55	2.15	1.82
4	2.5	2.5	3.4	5.9	8.8	4.3	3.7	3.9	4.2	3.2	2.15	1.74
5	2.4	2.4	4.4	5.4	7.6	4.1	3.7	3.6	4.4	3.6	2.05	1.68
6	2.3	2.4	5.4	6.3	6.1	3.9	3.5	3.45	4.0	4.7	1.93	1.62
7	2.2	3.5	5.6	9.6	5.3	3.7	3.4	3.35	3.8	5.3	1.84	1.59
8	2.1	9.1	5.2	14.5	4.4	3.45	3.25	3.35	5.8	4.0	1.78	1.92
9	2.05	6.8	4.6	11.7	4.2	3.4	3.1	3.2	6.4	3.25	1.72	2.6
10	2.0	5.3	4.2	7.8	3.9	3.35	3.05	3.0	5.4	3.05	1.66	2.5
11	1.95	4.4	3.8	6.5	4.0	4.3	3.05	2.9	4.5	4.6	1.69	2.2
12	1.91	4.1	3.6	5.9	6.4	6.1	3.25	2.8	4.0	3.8	1.84	2.0
13	1.85	3.9	3.2	6.8	6.0	5.9	4.3	2.7	3.6	3.25	1.79	1.92
14	1.82	3.6	2.75	6.1	5.2	7.6	4.5	2.65	3.3	3.1	2.65	1.82
15	1.78	3.6	3.1	5.3	4.7	8.4	10.7	2.6	3.0	2.95	2.85	1.75
16	1.71	3.4	3.05	4.8	4.4	7.6	9.1	2.65	2.8	3.35	2.45	1.69
17	1.75	3.1	3.0	4.3	4.0	6.4	7.0	3.0	4.8	3.6	2.2	1.65
18	1.78	3.0	2.9	4.2	3.8	5.4	5.7	4.9	3.35	3.2	2.05	1.64
19	1.78	2.95	2.9	4.1	3.6	4.8	5.0	4.4	2.75	3.35	2.3	1.72
20	1.72	2.9	2.9	3.9	3.45	4.4	4.6	3.9	2.5	6.4	2.65	2.25
21	3.0	2.85	2.7	4.1	3.5	4.1	4.2	4.0	2.35	5.2	3.0	2.2
22	2.7	2.8	2.55	4.9	3.8	3.9	3.9	4.4	2.3	4.0	2.7	5.3
23	2.55	2.7	2.4	4.8	4.3	3.7	3.7	4.9	2.65	3.45	3.6	4.1
24	3.5	2.65	2.6	5.0	4.2	3.5	3.5	9.1	2.75	3.1	4.6	3.3
25	4.4	2.6	2.5	6.2	4.0	3.4	3.45	7.4	2.75	3.8	3.6	2.9
26	3.7	2.6	3.15	6.6	3.7	3.5	3.25	5.8	3.05	3.8	3.1	2.6
27	3.4	2.6	2.65	6.2	3.7	11.3	3.45	6.9	4.15	3.25	2.7	2.4
28	3.15	2.5	3.0	5.9	4.2	10.1	4.6	10.6	3.45	2.95	2.5	2.25
29	2.95	2.4	3.4	5.3	...	7.0	4.9	8.1	2.95	2.85	2.3	2.15
30	2.75	2.3	4.5	4.8	...	6.3	5.2	6.6	2.7	2.6	2.15	2.15
31	2.6	...	9.2	4.7	...	5.5	...	7.3	...	2.4	2.05	...

Note.—Observer made no report concerning ice. Discharge relation probably not affected by ice during the year ending September 30, 1913.

The following data for the year ending September 30, 1914, are taken from pages 62 and 63 of Water-Supply Paper No. 383 of the U. S. Geological Survey:

"Extremes of Stage.—Maximum stage recorded during year: 14.1 feet at 6 p. m. November 16, 1913. Minimum stage not known because no gage readings are available from July 14 to August 1, 1914.

"The following discharge measurement was made at Gauley Bridge, about 5 miles below the gage, by Peterson and Walters:

"November 21, 1913: Gage height, 4.69 feet; discharge, 3,540 second-feet."

Daily Gage Height, in Feet, of Gauley River near Belva, W. Va., for the Year Ending September 30, 1914.

(C. L. Davis, observer).

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	2.35	3.4	5.3	4.2	7.4	4.0	6.6	4.5	1.82	1.59	...	2.7
2	2.75	3.2	7.6	4.0	6.0	3.75	8.0	4.1	1.82	1.49	1.37	2.55
3	2.8	3.05	7.2	3.95	5.3	3.4	8.2	3.8	1.78	1.39	1.28	2.45
4	4.1	2.95	5.9	3.85	4.8	3.5	6.8	3.6	1.73	1.33	1.20	2.4
5	4.0	2.8	5.2	3.8	4.5	3.8	5.7	3.8	1.82	1.25	1.14	2.25
6	3.4	2.65	4.6	3.75	4.5	3.85	5.1	6.1	1.81	1.15	1.04	1.95
7	3.0	2.6	4.6	3.7	5.2	4.2	4.6	6.7	1.77	1.05	1.00	1.88
8	2.7	2.6	6.0	3.8	5.8	4.0	5.0	5.9	1.77	1.17	0.94	1.82
9	2.55	2.95	5.6	4.7	5.2	3.85	9.0	5.4	1.73	1.37	0.91	1.81
10	2.75	4.8	5.1	6.4	4.8	3.6	7.0	4.9	1.67	1.14	1.14	1.81
11	3.1	4.6	4.7	6.2	4.4	3.9	5.9	4.6	1.61	0.99	1.84	1.81
12	2.95	4.4	4.3	5.4	4.0	5.0	5.1	4.2	1.55	0.93	2.1	1.81
13	2.8	4.9	4.0	4.5	3.65	4.8	4.6	3.95	1.45	0.92	2.0	1.84
14	2.75	8.0	3.75	4.3	3.55	4.8	4.3	3.75	1.41	....	2.45	1.91
15	2.6	11.3	3.6	4.2	3.5	5.1	4.2	3.55	1.36	....	2.35	1.87
16	2.5	13.2	3.5	4.1	3.6	6.6	7.4	3.35	1.45	....	2.1	1.83
17	2.4	12.5	3.4	4.2	3.75	8.6	9.0	3.15	1.39	....	1.92	1.77
18	2.35	8.5	3.3	4.2	3.5	9.0	7.1	3.0	1.29	....	1.78	1.63
19	2.4	6.5	3.3	4.0	7.1	7.3	5.9	2.85	1.22	....	1.67	1.54
20	3.25	5.4	3.3	4.2	11.8	6.3	8.7	2.75	1.15	....	1.58	1.50
21	5.4	4.7	3.2	9.1	8.0	5.3	6.5	2.65	1.03	....	1.62	1.43
22	5.0	4.3	3.15	8.5	6.8	5.0	7.7	2.55	0.96	....	1.55	1.37
23	4.4	3.85	3.1	6.4	5.7	4.7	5.7	2.5	0.91	....	1.97	1.29
24	4.4	3.65	3.05	5.7	5.3	4.7	5.1	2.45	0.89	....	1.98	1.25
25	7.0	3.4	3.15	8.6	4.6	4.9	4.6	2.35	0.89	....	1.88	1.20
26	11.0	3.25	4.0	8.0	4.4	7.0	6.8	2.25	1.03	....	1.92	1.14
27	7.7	3.1	5.6	6.6	4.2	9.2	8.6	2.15	2.25	....	3.25	1.13
28	6.0	3.4	5.0	5.7	4.0	9.1	6.6	2.1	2.15	....	3.4	1.13
29	5.0	5.7	4.6	5.5	....	8.6	5.6	1.99	1.92	....	3.0	1.13
30	4.4	5.5	4.4	5.8	....	7.9	5.0	1.93	1.72	....	3.2	1.21
31	3.85	....	4.3	6.2	....	7.3	....	1.85	...	....	2.85	....

Note.—Discharge relation probably affected by ice Feb. 13-18 and Mar. 25.

The following data for the year ending September 30, 1915, are taken from pages 68 and 69 of Water-Supply Paper No. 403 of the U. S. Geological Survey:

"Gage.—Vertical staff fastened to tree on right bank; read daily, morning and evening, to hundredths by Stephen Elliott.

"Extremes of Stage.—Maximum stage recorded during year, 7.85 feet at 7 a. m. February 16; minimum stage, 0.95 foot at 6 p. m. October 8 and 9.

"The following discharge measurements were made by wading, by Mathers and Morgan:

"November 5, 1914: Gage height, 2.06 feet; discharge, 315 second-feet.

"November 11, 1914: Gage height, 1.83 feet; discharge, 206 second-feet."

Daily Gage Height, in Feet, of Gauley River near Belva, W. Va., for the Year Ending September 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	1.26	2.25	1.98	.....	.....	4.3	3.50	5.62	5.14	1.81	2.66	2.45
2	1.19	2.25	2.55	.....	.....	4.0	3.30	4.82	4.44	1.93	2.66	2.33
3	1.11	2.15	3.25	.....	.....	3.8	3.25	4.39	4.26	2.50	2.96	2.21
4	1.06	2.15	3.6	.....	.....	3.65	3.21	4.69	5.51	2.47	3.42	2.55
5	1.01	2.05	5.8	.....	.....	3.6	3.13	4.61	4.88	2.39	2.99	4.18
6	0.99	2.0	6.9	.....	.....	4.3	3.02	4.28	4.21	3.08	2.66	4.41
7	0.94	1.96	5.4	.....	.....	4.5	3.08	3.97	3.71	3.23	2.44	3.93
8	0.91	1.89	4.3	.....	.....	4.4	4.46	3.73	3.46	2.85	2.26	3.35
9	0.93	1.86	4.2	.....	4.9	4.3	4.38	3.51	3.28	2.77	2.20	3.02
10	1.17	1.82	4.0	.....	4.4	4.0	4.34	3.25	3.04	3.24	2.12	2.76
11	1.33	1.82	3.9	.....	4.1	4.0	4.36	3.05	2.78	2.96	2.09	2.58
12	1.25	1.83	3.7	.....	4.0	4.1	4.38	2.92	2.67	2.83	2.13	2.31
13	1.30	1.82	3.5	.....	3.9	3.95	4.19	2.85	2.56	2.89	2.08	2.21
14	1.51	1.76	3.3	.....	4.1	3.75	3.96	2.83	3.11	2.69	3.12	2.19
15	1.49	1.74	3.15	.....	5.3	3.7	3.70	2.73	5.86	2.43	2.59	2.09
16	1.54	1.74	3.15	.....	7.5	3.9	3.56	2.62	5.11	2.35	2.62	2.35
17	2.95	2.25	3.15	.....	6.2	4.2	3.43	2.55	4.34	2.45	2.74	2.10
18	3.1	2.85	3.15	.....	5.4	4.3	3.31	2.48	3.78	5.10	3.50	1.98
19	2.7	2.6	3.25	.....	4.8	4.2	3.22	2.36	3.64	4.20	4.16	1.96
20	2.45	2.5	.....	.....	4.3	4.0	3.06	2.30	3.17	4.35	3.38	2.34
21	2.4	2.35	.....	.....	3.95	3.8	2.98	2.37	2.84	5.05	2.94	2.64
22	2.15	2.2	.....	.....	3.7	3.6	2.92	2.46	2.64	5.10	2.75	3.42
23	2.05	2.05	.....	.....	3.55	3.45	2.86	2.58	2.57	4.29	2.95	3.42
24	2.05	2.15	.....	.....	3.55	3.35	2.84	2.77	2.50	3.52	3.16	2.94
25	2.05	2.0	.....	.....	6.3	3.25	3.06	2.99	2.36	3.10	2.85	2.62
26	2.4	1.96	.....	.....	5.4	3.15	3.18	3.13	2.15	2.79	2.69	2.40
27	2.7	2.0	.....	.....	4.9	3.6	3.06	4.11	2.07	2.61	2.53	2.33
28	2.55	2.0	.....	.....	4.5	3.75	3.56	4.07	1.97	2.44	2.39	2.62
29	2.35	2.0	.....	.....	.....	3.75	6.56	3.62	1.87	2.32	2.30	3.02
30	2.25	1.99	.....	.....	.....	3.7	6.58	4.56	1.80	2.22	2.81	2.82
31	2.2	.....	.....	.....	.....	3.6	.....	6.35	.....	2.12	2.63	....

Note.—Gage carried away by ice Dec. 20, 1914; no gage readings Dec. 20, to Feb. 8.

The following data concerning the Gaging Station located on Meadow River near Russellville, West Virginia, are taken from page 88 of Water-Supply Paper No. 243 of the U. S. Geological Survey:

Meadow River near Russellville, W. Va.

"This station is located at Bays Ferry, about 3 miles below Russellville, W. Va. It was established July 17, 1908, to obtain data for use in studying water-power, flood control, and storage problems.

"Youngs Creek enters about one-fourth mile above the section. The drainage area above the section is about 297 square miles.

"This is a cable and boat station. Low-water measurements are made by wading.

"The datum of the gage has remained unchanged. The records are reliable and accurate. Sufficient data have not been obtained to enable estimates of the flow to be made."

Discharge Measurements of Meadow River near Russellville, W. Va., in 1908.

Date	Hydrographer	Width Feet	Area of section Sq. ft.	Gage height Feet	Discharge Sec.-ft.
July 18.......	O'Neil and Chapman	106	393	4.07	154
August 7a....	W. G. Hoyt.....	95	114	3.75	68

aWading measurement.

Daily Gage Height, in Feet, of Meadow River near Russellville, W. Va., for 1908.

(Observer, Jacob R. Bays).

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.
1..	....	4.28	3.38	2.81	3.94	3.38
2..	....	4.05	3.32	2.83	3.73	3.48
3..	....	3.89	3.24	2.83	3.52	3.39
4..	....	3.77	3.18	2.84	3.38	3.38
5..	....	3.68	3.16	2.84	3.30	3.36
6..	....	3.74	3.16	2.85	3.24	3.35
7..	....	3.70	3.15	2.85	3.19	3.58
8..	....	3.64	3.14	2.85	3.16	4.21
9..	....	4.16	3.12	2.85	3.15	4.50
10..	....	5.31	3.10	2.87	3.13	4.46
11..	....	4.78	3.07	2.93	3.12	4.32
12..	....	4.39	3.04	2.94	3.13	5.94
13..	....	4.07	3.03	2.97	3.16	6.30
14..	....	3.88	3.02	3.04	3.21	5.62
15..	....	3.76	3.01	3.24	3.21	5.22
16..	....	3.70	2.98	3.27	3.19	4.84
17..	....	3.67	2.95	3.16	3.19	4.52
18..	....	3.62	2.93	3.15	3.25	4.69
19..	4.08	3.52	2.92	3.13	3.24	5.59
20..	4.06	3.46	2.89	3.10	3.35	5.57
21..	4.00	3.39	2.87	3.09	3.95	5.19
22..	3.98	3.36	2.87	3.07	4.00	4.95
23..	4.25	3.36	2.85	3.04	3.85	4.83
24..	4.04	3.35	2.85	3.04	3.73	4.67
25..	3.97	3.36	2.85	3.02	3.61	4.61
26..	4.00	3.50	2.84	3.02	3.52	5.23
27..	5.08	4.44	2.83	3.02	3.47	5.20
28..	6.04	4.09	2.83	3.01	3.44	5.13
29..	5.58	3.82	2.82	3.28	3.42	5.13
30..	4.96	3.62	2.82	3.38	3.38	5.29
31..	4.60	3.49	....	4.08	....	6.88

The description of this station quoted above is repeated on page 94 of Water-Supply Paper 263 of the U. S. Geological Survey giving the data for 1909, with the further statement that "the chain gage is attached to trees on the left bank above the ferry". The data for this station for 1909 given below are from the reference last cited.

Daily Gage Height, in Feet, of Meadow River near Russellville, W. Va., for 1909.

(Jacob R. Bays, observer.)

Day.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1.........	6.79	6.33	5.80	6.05	8.08	4.76	4.33	3.48	2.94	3.16	3.76	3.73
2.........	6.45	5.94	5.50	5.75	8.16	4.51	5.40	3.56	2.90	3.14	3.72	3.71
3.........	5.70	5.65	5.43	5.70	7.54	4.42	5.06	3.90	2.89	3.10	3.66	3.70
4.........	5.33	5.45	6.36	5.65	6.76	4.40	4.72	3.60	2.94	3.06	3.64	3.68
5.........	5.99	5.39	6.30	5.88	6.22	4.68	4.32	3.51	3.16	3.02	3.56	3.66
6.........	8.17	5.59	6.23	5.94	5.72	4.78	4.90	3.38	3.14	3.00	3.50	3.60
7.........	7.59	5.65	6.90	5.73	5.42	4.78	6.48	3.29	3.30	3.00	3.45	3.60
8.........	6.78	5.46	8.21	5.40	5.32	4.52	6.04	3.23	3.26	2.99	3.42	3.74
9.........	6.08	5.37	8.49	5.16	5.32	4.41	5.56	3.20	3.26	3.00	3.52	3.88
10.........	5.48	6.72	9.29	5.02	5.84	4.64	5.11	3.26	3.60	3.03	3.68	3.79
11.........	5.22	7.37	8.62	4.82	7.44	4.97	4.53	3.24	4.52	3.18	5.00	3.80
12.........	5.12	6.82	7.42	4.68	6.92	5.18	4.26	3.18	4.46	3.75	4.88	3.96
13.........	4.96	6.48	6.74	4.58	6.39	5.07	4.18	3.12	4.12	4.40	4.56	4.32
14.........	4.82	6.33	6.92	8.72	5.82	5.37	4.68	3.10	3.74	4.15	4.38	6.13
15.........	6.75	6.15	6.78	8.70	5.36	5.69	4.48	3.20	3.52	3.95	4.21	6.12
16.........	8.04	7.49	6.35	7.48	5.07	5.42	4.18	4.36	3.40	3.76	4.08	5.96
17.........	7.68	7.79	5.93	6.58	4.84	5.10	3.96	5.38	3.36	3.66	....	5.20
18.........	7.15	7.03	5.55	5.88	4.60	5.16	3.80	4.86	3.40	3.64	....	5.32
19.........	6.55	6.53	5.27	5.44	4.44	4.94	3.90	4.34	3.62	3.67	....	5.44
20.........	6.14	6.55	5.12	5.22	4.34	4.60	3.82	3.98	3.48	3.52	....	5.09
21.........	6.03	6.62	5.07	5.11	4.30	4.36	3.74	3.69	3.32	3.47	....	4.65
22.........	6.08	7.20	5.39	6.26	4.62	4.26	3.64	3.49	3.24	3.45	....	4.40
23.........	6.14	7.06	5.49	7.40	4.81	4.12	3.64	3.34	3.20	3.51	....	4.26
24.........	6.16	6.88	5.65	7.57	4.68	4.25	3.80	3.28	3.26	3.82	....	4.08
25.........	5.93	7.10	6.71	6.98	4.49	4.35	3.97	3.19	4.06	4.43	....	4.06
26.........	5.74	6.84	8.03	6.39	4.98	4.24	3.38	3.12	3.74	4.42	....	4.04
27.........	5.58	6.52	7.96	5.96	6.00	4.02	3.64	3.10	3.56	4.40	....	3.95
28.........	5.36	6.20	8.75	5.75	6.16	3.92	3.61	3.08	3.43	4.28	....	3.94
29.........	5.28	....	8.20	5.58	6.05	3.83	3.52	3.05	3.38	4.10	....	3.91
30.........	5.22	....	7.31	5.98	5.55	3.99	3.54	3.01	3.13	4.01	....	3.88
31.........	6.31	....	6.55	....	5.08	....	3.48	2.98	....	3.85	....	3.86

Note.—Ice conditions December 9 to 31. December 21, thickness of ice, 0.3 foot. December 26 to 31, gage readings are to top of ice.

The following data concerning the gaging station near Russellville for the year 1910 are taken from page 84 of Water-Supply Paper No. 283 of the U. S. Geological Survey:

Discharge Measurements of Meadow River near Russellville, W. Va., in 1910.

Date	Hydrographer	Width Feet	Area of section Sq. ft.	Gage height Feet	Discharge Sec.-ft.
March 2	C. T. Bailey....	115	350	4.51	233
March 26.....	C. T. Bailey....	115	339	4.35	216
October 14....	C. T. Bailey....	102	243	3.61	62.9
October 15....	C. T. Bailey....	99	226	3.46	47.1

Daily Gage Height, in Feet, of Meadow River near Russellville, W. Va., for 1910.

(J. R. Bays, Observer).

Day.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.86	a6.48	8.27	4.02	5.62	4.59	4.42	3.62	3.24	4.37	3.62	5.40
2	4.11	6.42	8.25	3.98	5.30	4.59	4.20	3.49	3.68	4.17	3.68	a5.59
3	....	6.26	7.64	4.02	5.00	4.52	4.14	3.47	4.25	3.89	3.71	6.34
4	8.26	6.20	6.91	4.12	4.93	4.44	4.34	3.45	4.08	3.58	3.77	5.61
5	7.31	5.73	6.33	4.89	4.78	4.71	4.27	3.43	4.95	3.46	3.82	5.16
6	6.60	a6.11	5.90	4.83	4.64	8.89	4.53	3.39	4.91	3.36	3.83	4.92
7	8.66	6.44	5.63	4.72	4.50	8.92	4.97	3.35	4.46	3.35	3.80	4.73
8	7.93	6.08	5.37	4.56	4.66	7.46	5.23	3.34	4.12	3.49	3.76	4.79
9	7.09	5.89	5.13	4.38	5.40	7.36	4.59	3.32	3.94	4.17	3.70	4.71
10	6.59	5.76	5.01	4.25	5.82	5.99	4.69	3.29	3.89	4.35	3.69	4.61
11	a8.18	5.62	4.93	4.18	5.73	6.62	4.48	3.26	3.79	4.03	3.68	4.52
12	7.52	5.47	4.84	4.38	6.06	7.16	4.26	3.22	3.67	3.81	3.66	4.34
13	7.20	5.36	4.83	5.85	6.74	7.94	4.48	3.38	3.91	3.66	3.64	4.31
14	6.90	5.28	5.59	6.22	6.28	7.64	4.71	3.42	4.29	3.52	3.62	4.22
15	6.54	5.15	5.75	5.90	5.79	7.52	4.63	3.34	4.60	3.45	3.62	4.16
16	6.67	5.47	5.45	5.57	5.40	9.04	4.47	3.72	4.21	3.39	3.62	4.14
17	6.62	8.61	5.23	5.37	5.12	9.83	4.41	3.60	3.89	3.33	3.64	4.04
18	6.10	8.85	5.64	6.54	5.08	8.60	4.63	3.34	3.61	3.30	3.57	4.03
19	8.08	8.28	4.81	6.82	5.20	7.52	5.39	3.32	3.51	3.26	3.51	4.20
20	7.42	7.48	4.61	6.74	5.10	6.38	5.56	3.38	3.49	3.23	3.42	4.39
21	7.78	6.62	4.65	7.49	5.22	5.62	5.13	3.27	3.45	3.20	3.42	4.34
22	8.62	6.74	4.61	7.94	5.50	5.35	4.66	3.40	3.43	3.30	3.47	4.32
23	7.55	7.28	4.56	8.09	5.63	5.16	4.35	3.54	3.39	3.46	3.49	4.48
24	6.89	6.87	4.47	8.05	5.50	5.04	4.27	3.43	3.33	3.66	3.48	5.05
25	6.00	6.31	4.40	7.42	5.44	4.94	3.97	3.29	3.38	3.52	3.78	5.88
26	5.63	5.82	4.32	6.76	5.41	4.66	3.90	3.26	3.49	3.44	4.52	5.63
27	5.67	5.57	4.27	6.34	5.22	4.60	3.77	3.22	3.72	3.38	4.54	5.52
28	6.08	5.91	4.20	6.38	5.04	4.79	4.27	3.15	4.11	3.54	5.36	5.26
29	5.98	....	4.15	6.29	4.81	4.92	4.27	3.11	4.09	3.63	6.37	5.96
30	5.70	....	4.10	5.98	4.66	4.66	4.00	3.10	4.39	3.84	5.89	10.26
31	5.50	....	4.08	....	4.69	....	3.77	3.14	....	3.72	....	9.35

aIce gorge reported by observer Jan. 11, Feb. 1 and 6, and Dec. 2.

Note.—Relation of gage height to discharge affected by ice about Jan. 1 to 13, Feb. 1 to 7, and Dec. 2 to 24.

The following data for the year 1911 are taken from pages 56 and 57 of Water-Supply Paper No. 303 of the U. S. Geological Survey:

"**Channel.**—Permanent.

"**Discharge Measurements.**—Made from a boat or by wading.

"**Accuracy.**—Gage-height records are considered very reliable. In the fall backwater is sometimes caused at the gage by leaves lodging at the riffle below. Sufficient data have not been collected to permit estimates of discharge to be made."

"The following discharge measurement was made by C. T. Bailey by wading at section above regular measuring section:

"July 29, 1911: Gage height, 3.03 feet; discharge, 15.2 second-feet."

Daily Gage Height, in Feet, of Meadow River near Russellville, W. Va., for 1911.

(J. R. Bays, Observer).

Day.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	8.44	9.19	4.96	5.85	5.07	4.41	3.32	2.90	3.76	3.17	3.98	5.34
2	10.09	8.57	4.98	5.76	5.20	4.53	3.20	2.87	4.04	3.32	3.89	5.16
3	11.04	7.62	4.84	6.26	5.42	4.10	3.13	2.84	3.72	3.76	3.81	4.96
4	9.74	6.93	4.79	8.34	5.35	3.84	3.22	2.80	3.46	4.28	3.74	4.73
5	7.97	6.51	4.67	9.98	5.18	3.76	3.58	2.75	3.26	4.22	3.69	4.80
6	6.84	6.02	8.19	9.52	4.96	3.72	3.42	2.72	3.22	4.11	3.94	4.60
7	6.14	5.74	9.24	8.43	4.80	3.89	3.98	2.95	3.20	3.94	7.33	4.42
8	5.78	5.58	8.59	7.64	4.68	3.66	3.72	3.44	3.16	4.33	7.02	4.30
9	5.30	6.50	7.31	8.00	4.60	3.52	3.58	3.42	3.08	4.43	6.36	4.34
10	5.80	6.90	7.28	7.88	4.52	3.40	3.37	3.19	2.98	4.32	5.86	4.30
11	5.04	6.69	7.70	7.26	4.44	3.37	3.38	3.25	3.03	4.60	5.38	4.32
12	4.91	6.32	7.30	6.65	4.31	3.36	4.10	3.26	3.28	5.10	4.98	4.38
13	5.80	5.90	6.80	6.51	4.23	3.64	3.98	3.14	3.36	4.78	5.18	4.40
14	7.22	5.53	6.34	6.42	4.13	3.98	3.69	3.01	3.34	4.55	5.29	4.40
15	7.18	5.26	6.02	7.52	4.05	3.83	3.45	2.94	3.32	5.15	5.28	4.36
16	7.53	4.95	5.78	7.72	3.99	3.67	3.26	2.94	3.41	5.40	5.16	4.49
17	6.94	4.76	5.52	7.15	3.94	3.56	3.20	2.90	3.95	5.12	4.93	4.68
18	6.22	4.70	5.42	6.49	3.92	3.56	3.18	2.90	3.78	9.00	5.62	5.04
19	5.77	4.82	5.36	5.98	3.88	3.58	3.10	3.01	3.56	7.72	6.30	5.02
20	5.48	5.38	7.22	6.93	3.81	3.72	3.06	3.00	3.41	6.58	5.88	4.94
21	5.60	5.58	7.08	7.46	3.75	3.66	3.03	2.98	3.32	5.88	5.52	4.78
22	7.24	5.54	6.52	7.40	3.67	3.58	3.11	2.91	3.84	5.24	5.24	4.74
23	7.17	5.28	6.16	7.63	3.62	3.44	3.08	2.85	3.88	5.14	4.99	5.24
24	6.81	5.73	5.70	6.98	3.57	3.34	3.12	2.82	3.82	5.24	5.01	6.30
25	6.35	5.10	5.35	6.40	3.58	3.28	3.14	2.78	3.63	4.96	5.42	6.39
26	6.22	5.03	5.18	5.92	3.68	3.24	3.10	2.76	3.48	4.71	5.42	6.57
27	7.06	5.00	5.40	5.54	3.62	3.54	3.04	2.74	3.31	4.52	5.35	7.28
28	7.18	4.96	5.84	5.28	3.56	3.55	3.03	2.72	3.28	4.37	5.41	7.30
29	8.06	....	5.76	5.12	4.52	3.44	3.02	2.90	3.24	4.24	5.68	6.72
30	13.02	....	5.84	5.04	4.28	3.40	3.00	3.00	3.19	4.14	5.55	6.20
31	11.06	....	5.94	....	3.88	....	2.94	3.12	....	4.03	....	6.11

Note.—Observer reported ice as follows: Jan. 10 and Feb. 22, ice gorged: Feb. 24 and Dec. 5, backwater, from ice.

The following data concerning the gaging station on Meadow River near Russellville are taken from pages 62 and 63 of Water-Supply Paper No. 323 of the U. S. Geological Survey:

"**Accuracy.**—* * * Because of an error in the gage found by wye levels on November 20, 1913 (before this report was prepared), gage heights of discharge measurements and daily gage heights for this station for 1909, 1910, and 1911, published in Water-Supply Papers 263, 283, and 303, should be corrected as follows:

"February 21, 1909, to June 7, subtract 0.02 foot.

"June 8 to September 24, subtract 0.03 foot.

"September 25, 1909, to January 11, 1910, subtract 0.04 foot.

"January 12 to April 28, subtract 0.05 foot.

"April 29 to August 15, subtract 0.06 foot.

"August 16 to November 30, subtract 0.07 foot.

"December 1, 1910, to March 17, 1911, subtract 0.08 foot.

"March 18 to July 3, subtract 0.09 foot.

"July 4 to October 19, subtract 0.10 foot.

"October 20 to December 31, 1911, subtract 0.11 foot."

"The necessary corrections have been applied to the gage heights in the following tables:

Discharge Measurements of Meadow River near Russellville, W. Va., in 1912.

Date	Hydrographer	Gage Height Feet	Discharge Sec.-ft.
March 27.....	C. T. Bailey....................	7.02	1,370
March 30.....	C. T. Bailey.....................	9.44	3,230

Daily Gage Height, in Feet, of Meadow River near Russellville, W. Va., for 1912.

(J. R. Bays, observer.)

Day.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1.........	6.3	6.8	6.4	7.5	6.9	3.81	4.55	3.79	4.15	3.83	3.86	3.56
2.........	6.3	6.4	5.9	7.8	6.3	3.73	4.06	3.69	4.09	3.71	3.82	3.74
3.........	6.0	5.8	5.35	8.7	6.0	3.65	3.85	3.57	3.89	3.60	3.78	3.98
4.........	5.7	5.6	5.0	8.1	5.6	3.57	4.07	3.39	3.73	3.51	3.71	4.65
5.........	6.3	[a]5.5	4.95	7.0	5.25	3.50	4.5	3.35	3.71	3.42	3.60	6.0
6.........	5.6	[a]5.2	4.8	6.3	5.15	3.42	4.8	3.29	3.67	3.33	3.56	6.4
7.........	5.5	[a]5.1	4.7	5.8	6.1	3.37	4.9	3.23	3.59	3.27	4.41	6.6
8.........	5.3	[a]5.05	4.7	5.4	6.3	3.29	4.7	3.18	3.49	3.24	7.9	6.2
9.........	5.1	4.75	5.9	5.8	6.1	3.26	4.17	3.15	3.35	3.19	6.9	5.6
10.........	4.85	4.43	6.3	5.5	5.7	3.21	4.42	3.14	3.27	3.15	5.9	5.15
11.........	....	4.38	6.2	5.3	5.4	3.09	4.29	3.13	3.23	3.12	5.45	4.9
12.........	....	4.36	6.4	5.05	9.3	3.04	4.23	3.11	3.19	3.10	5.0	4.7
13.........	....	4.36	8.3	4.9	9.4	3.00	4.09	3.09	3.17	3.10	4.75	4.55
14.........	....	4.32	8.2	4.8	8.5	2.95	3.84	3.08	3.05	3.12	4.65	4.35
15.........	4.36	4.22	10.9	4.7	7.2	2.91	4.17	3.06	2.94	3.15	4.55	4.33
16.........	....	4.18	12.2	4.9	9.1	2.89	4.11	3.05	2.96	3.20	4.41	4.28
17.........	....	4.19	9.6	5.1	11.1	2.87	4.11	3.01	2.94	3.27	4.29	4.23
18.........	....	4.26	7.8	5.5	9.1	3.05	4.95	2.98	2.98	3.24	4.22	4.17
19.........	....	4.43	7.1	5.7	7.2	3.38	4.55	3.09	3.00	3.44	4.14	4.14
20.........	....	4.85	6.8	5.5	6.3	3.72	3.89	3.41	2.98	4.46	4.07	4.07
21.........	....	7.1	7.3	5.3	5.6	3.80	3.66	4.04	2.95	4.41	4.02	3.97
22.........	5.4	....	7.3	5.1	5.1	3.52	3.57	4.8	2.94	4.20	3.96	3.83
23.........	....	8.3	7.0	5.5	4.85	3.34	3.43	4.55	3.14	4.41	3.93	3.80
24.........	....	7.1	7.9	5.6	4.65	3.25	3.35	4.23	4.10	5.1	3.90	3.76
25.........	....	6.4	8.8	5.35	4.47	3.15	4.07	3.84	4.55	5.25	3.89	....
26.........	....	7.3	8.3	5.2	4.34	3.41	5.15	3.59	4.46	4.85	3.87	3.79
27.........	....	10.0	7.1	5.5	4.21	3.83	4.7	3.44	4.22	4.7	3.82	3.91
28.........	....	8.4	6.5	6.8	4.07	6.2	4.32	3.37	4.10	4.26	3.70	3.98
29.........	4.37	7.2	8.7	6.5	4.04	5.7	3.97	3.81	4.00	4.20	3.46	3.96
30.........	7.5	....	9.5	7.0	4.01	5.25	3.89	4.34	3.89	4.06	3.38	5.00
31.........	7.3	....	8.5	....	3.89	....	3.83	4.19	....	3.94	....	8.0

[a]Gage height to top of ice.

"**Note.**—Relation of gage height to discharge affected by ice about Jan. 5-29 and Feb. 4-8. Observer reported as follows: Jan. 5, ice gorge; Jan. 10, river frozen up and ice 4 inches thick at gage; Jan. 15, control frozen, river entirely frozen over, ice

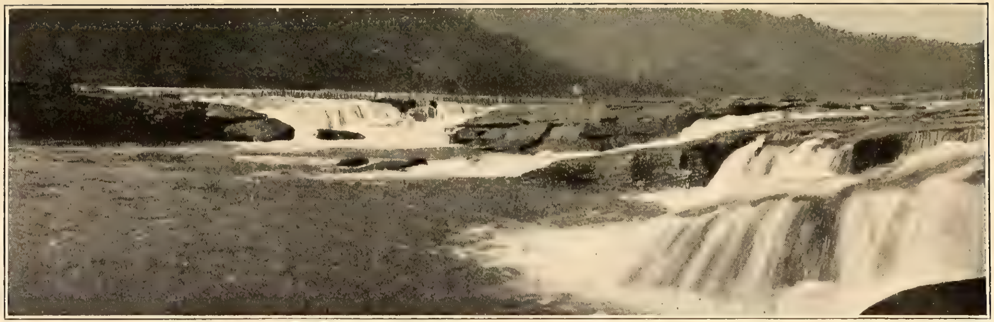

PLATE IV(a).—Showing Falls of the Kanawha River across the great Lower Nuttall Sandstone ledge, just above Kanawha Falls station on the C. & O. Railroad.

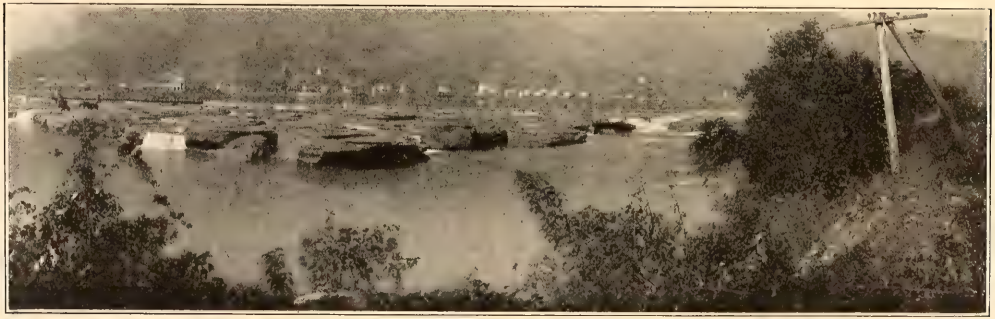

PLATE IV(b).—Another view of the same Falls and also of the town of Glen Ferris on northwest bank of Kanawha River.

5 inches thick at gage; Jan. 22 and 29, control open, river partly frozen over, ice 6 and 4 inches thick at gage; and Jan. 30, ice gone out. No notes relative to ice during February. In October and November the gage observer reported that false work for the construction of the piers of the new county highway bridge below the gage was placed about the middle of October; that piers were started Oct. 28 and finished Nov. 6, and that the bridge would not be completed until after Dec. 31, 1912."

The following data for the gaging station on Meadow River near Russellville for the year ending September 30, 1913, are taken from page 65 of Water-Supply Paper No. 353 of the U. S. Geological Survey:

"**Gage.**—* * * Read daily, morning and evening, to hundredths. Limits of use: Hundredths below 4.5; half-tenths from 4.5 to 5.5, and tenths above 5.5 feet.

"No discharge measurements were made at this station during the year ending September 30, 1913."

Daily Gage Height, in Feet, of Meadow River near Russellville, W. Va., for the Year Ending September 30, 1913.

(J. R. Bays, Observer).

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1.........	3.83	3.86	3.56	7.0	6.4	6.5	5.8	5.3	6.1	3.42	3.18	3.04
2.........	3.71	3.82	3.74	6.4	6.2	6.2	5.4	5.05	5.6	3.32	3.13	3.01
3.........	3.60	3.78	3.98	6.3	6.4	5.45	5.1	4.85	5.2	3.27	3.11	2.96
4.........	3.51	3.71	4.65	6.8	8.5	5.6	4.9	4.7	5.6	4.85	3.03	2.91
5.........	3.42	3.60	6.0	6.8	8.0	5.3	4.8	4.6	5.5	4.6	3.00	2.88
6.........	3.33	3.56	6.4	6.8	7.0	5.2	4.7	4.43	6.1	5.1	3.01	2.85
7.........	3.27	4.41	6.6	8.8	6.2	5.05	4.5	4.85	6.3	5.0	2.96	2.91
8.........	3.24	7.9	6.2	....	7.7	4.75	4.41	4.75	7.2	4.31	2.93	2.97
9.........	3.19	6.9	5.6	8.9	7.4	4.65	4.32	4.6	7.2	3.91	2.90	3.07
10.........	3.15	5.9	5.15	7.5	6.6	4.9	4.26	4.45	6.5	3.82	2.85	3.10
11.........	3.12	5.45	4.9	7.2	6.5	6.6	4.22	4.33	5.7	3.82	....	3.16
12.........	3.10	5.0	4.7	6.8	6.8	7.7	4.6	4.25	5.25	3.92	....	3.10
13.........	3.10	4.75	4.55	6.6	7.5	7.1	5.6	4.19	4.9	3.80	3.71	3.05
14.........	3.12	4.65	4.35	6.4	7.5	8.3	5.6	4.12	4.6	3.63	3.40	2.97
15.........	3.15	4.55	4.33	6.0	7.3	10.1	*a*9.8	4.07	4.35	3.73	3.22	2.93
16.........	3.20	4.41	4.28	5.6	6.7	8.9	....	4.05	4.19	3.92	3.22	2.89
17.........	3.27	4.29	4.23	5.35	5.3	7.5	7.4	5.0	4.14	4.10	3.18	2.91
18.........	3.24	4.22	4.17	5.2	4.8	6.6	6.5	5.6	4.27	3.96	3.15	2.95
19.........	3.44	4.14	4.14	5.1	4.7	6.0	5.9	5.2	3.81	3.89	3.22	3.23
20.........	4.46	4.07	4.07	5.05	4.65	5.5	5.3	4.95	3.67	6.0	3.26	3.37
21.........	4.41	4.02	3.97	5.2	4.75	5.3	5.1	6.8	3.59	5.6	3.11	3.71
22.........	4.20	3.96	3.83	5.45	5.1	5.1	4.9	6.6	3.59	5.1	3.54	5.5
23.........	4.41	3.93	3.80	5.4	5.3	4.85	4.75	6.8	3.63	4.28	4.29	4.7
24.........	5.1	3.90	3.76	6.0	5.35	4.75	4.6	....	3.62	4.06	4.44	4.2
25.........	5.25	3.89	....	6.9	5.25	4.7	4.48	7.6	3.59	3.98	3.92	3.71
26.........	4.85	3.87	3.79	6.8	5.0	5.15	4.43	6.7	3.90	3.80	3.60	3.61
27.........	4.7	3.82	3.91	6.6	5.05	8.5	4.7	8.0	3.87	3.68	3.40	3.43
28.........	4.26	3.70	3.98	6.5	6.05	10.4	5.2	....	3.87	3.53	3.30	....
29.........	4.20	3.46	3.96	6.3	....	8.6	5.35	8.3	3.64	3.42	3.18	3.25
30.........	4.06	3.38	5.0	6.1	....	7.4	5.4	7.3	3.53	3.35	3.10	3.40
31.........	3.94	....	8.0	6.0	....	6.5	....	6.6	....	3.26	3.04	....

*a*Gage height estimated by observer.

Note.—Observer reported backwater from ice Feb. 8 and 9. Discharge relation affected by ice about Feb. 7 to 18, 1913.

Water too high for observer to reach gage Jan. 8 and April 15-16.

The following data concerning the gaging station near Russellville for the year ending September 30, 1914, are taken from pages 64 and 65 of Water-Supply Paper No. 383 of the U. S. Geological Survey:

"**Discharge Measurements.**—Made from the concrete highway bridge built in 1913, or by wading.

"**Channel and Control.**—Practically permanent.

"**Extreme of Stage.**—Maximum stage recorded during year: 10.8 feet, November 17, 1918. Minimum stage recorded: 2.59 feet at 6 p. m. July 2, 1914."

Discharge Measurements of Meadow River near Russellville, W. Va., During the Year Ending September 30, 1914.

Date	Made by	Gage Height Feet	Discharge Sec.-ft.
November 18.	Peterson and Walters............	9.04	2,830
November 20.	Peterson and Walters............	6.50	1,050

Daily Gage Height, in Feet, of Meadow River near Rzussellville, W. Va., for the Year Ending September 30, 1914.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1.........	3.81	4.39	6.8	5.2	7.7	6.0	7.1	5.3	3.23	2.61	2.78	3.56
2.........	4.29	4.35	8.6	5.2	7.2	6.2	7.6	5.0	3.19	2.59	2.78	3.51
3.........	4.65	4.22	7.8	5.15	6.7	6.1	7.6	4.8	3.15	2.61	2.73	3.45
4.........	5.8	4.10	7.0	6.6	6.2	6.1	7.0	4.7	3.11	2.61	2.70	3.36
5.........	5.25	3.99	6.4	6.3	5.8	6.1	6.5	4.8	3.09	2.85	2.66	3.25
6.........	4.65	3.91	5.9	6.0	5.5	6.0	6.1	5.5	3.27	2.85	2.62	3.19
7.........	4.29	3.86	5.6	5.7	6.4	5.7	5.7	6.6	3.25	2.80	2.58	3.13
8.........	4.05	3.82	6.6	5.6	6.9	5.45	6.5	6.5	3.23	2.78	2.58	3.05
9.........	3.93	4.43	6.3	5.8	6.5	5.15	8.4	6.4	3.18	2.75	2.98	2.99
10.........	3.75	5.1	6.0	6.3	6.2	4.85	7.6	6.2	3.14	2.84	3.14	2.92
11.........	3.66	5.3	5.8	6.6	5.8	5.9	6.7	5.9	3.09	2.79	3.07	2.90
12.........	3.59	5.25	5.45	6.3	5.45	7.2	6.2	5.6	3.01	2.74	3.16	2.97
13.........	3.54	6.0	5.15	7.7	5.35	6.6	5.9	5.45	2.95	2.70	3.24	3.01
14.........	3.63	6.7	4.95	7.1	5.3	6.5	5.6	5.2	2.91	2.82	3.20	2.99
15.........	3.51	6.9	4.85	6.7	5.6	6.9	5.35	4.85	2.85	3.17	3.13	2.99
16.........	3.45	(a)	4.8	6.4	5.5	7.9	8.2	4.6	2.81	3.71	3.09	3.01
17.........	3.43	(a)	4.7	5.9	5.4	9.6	8.7	4.5	2.75	3.67	2.97	3.00
18.........	3.41	8.4	4.6	5.7	5.8	9.9	7.8	4.42	2.73	3.52	2.90	2.94
19.........	3.42	7.3	4.55	5.7	6.7	7.8	7.4	4.34	2.75	3.41	2.84	2.89
20.........	3.86	6.4	4.5	5.8	8.0	6.9	7.6	4.28	2.69	3.36	2.75	2.85
21.........	4.65	5.8	4.48	10.1	8.1	6.3	7.4	4.18	2.71	3.31	3.48	2.81
22.........	4.9	5.35	4.44	8.9	7.1	6.0	7.1	4.06	2.69	3.22	3.21	2.78
23.........	4.75	4.95	4.43	7.6	7.0	6.4	6.7	3.95	2.79	3.14	2.89	2.81
24.........	5.0	4.75	4.42	6.9	6.7	5.8	6.2	3.88	2.79	3.04	2.85	2.89
25.........	6.8	4.55	4.6	9.5	6.5	6.5	5.7	3.80	2.73	2.93	3.36	2.84
26.........	8.5	4.46	5.8	8.2	6.2	8.2	5.5	3.72	2.69	2.84	3.51	2.75
27.........	7.6	4.36	5.8	7.4	6.1	9.5	6.3	3.66	2.66	2.85	4.01	2.70
28.........	6.6	4.7	5.8	7.3	6.0	9.0	6.4	3.58	2.63	2.79	4.07	2.67
29.........	5.7	7.0	5.5	7.1	....	8.6	6.0	3.47	2.63	2.76	3.85	2.64
30.........	4.85	6.5	5.4	7.0	....	7.8	5.6	3.37	2.61	2.74	3.70	2.62
31.........	4.55	....	5.3	7.7	....	7.2	....	3.29	....	2.78	3.62	....

[a] Observer unable to reach gage; water too high. Flood reached a stage of 10.8 feet on Nov. 17 as determined when the station was visited on Nov. 18, 1913.

Note.—Discharge relation probably affected by ice about Jan. 13-20, Feb. 15-18, and March 1-6.

The following data concerning the gaging station near Russellville for the year ending September 30, 1915, are taken from pages 70 and 71 of Water-Supply Paper No. 403 of the U. S. Geological Survey:

"**Gage.**—Chain gage attached to trees on left bank just above the bridge, near former ferry crossing; read daily, morning and evening, to hundredths, by J. R. Bays.

"**Extreme of Stage.**—Maximum stage recorded during year, 13.25 feet at 7:40 a. m., February 3; minimum stage, 2.63 feet, October 4.

"Data inadequate for determining daily discharges.

"The following discharge measurements were made by Mathers and Morgan:

"October 30, 1914: Gage height, 3.39 feet; discharge, 49 second-feet. Gage height, 3.36 feet; discharge, 45 second-feet."

Daily Gage Height, in Feet, of Meadow River near Russellville, W. Va., for the Year Ending September 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	2.60	3.28	3.47	6.6	7.5	5.6	....	7.35	4.61	3.05	3.02	3.11
2	2.58	3.28	4.20	6.2	12.2	5.4	4.36	6.69	4.80	3.27	3.06	3.07
3	2.56	3.24	5.1	5.8	12.9	5.1	4.32	6.31	4.86	3.46	3.14	3.04
4	2.55	3.22	5.7	5.35	10.1	4.9	4.32	6.12	4.78	3.61	....	3.11
5	2.58	3.20	7.8	5.0	8.2	4.85	4.30	6.44	4.60	3.55	....	4.86
6	2.65	3.18	8.4	4.95	7.6	4.8	4.29	6.22	4.40	3.49	....	4.86
7	2.64	3.16	7.7	12.8	7.3	4.95	4.28	6.00	4.27	3.43	....	4.70
8	2.62	3.14	6.5	11.8	7.0	5.05	4.38	5.55	4.45	3.46	....	4.33
9	2.61	3.12	6.0	8.6	6.6	4.95	4.40	5.22	4.32	4.30	....	3.98
10	2.64	3.10	6.0	7.2	6.2	4.9	4.40	5.06	4.08	4.19	....	3.77
11	2.72	3.08	6.0	6.7	6.0	5.3	4.42	4.96	3.90	4.04	....	3.42
12	2.72	3.06	5.9	6.5	5.6	5.4	4.66	4.86	3.86	3.89	....	3.31
13	2.74	3.04	....	6.3	5.3	5.3	4.77	4.77	3.88	3.68	....	3.24
14	2.82	3.04	5.7	5.8	5.1	5.2	4.73	4.68	3.84	3.53	....	3.18
15	3.04	3.08	5.6	6.2	7.0	5.2	4.64	4.56	5.46	3.40	3.33	3.10
15	3.34	3.12	5.1	6.2	8.0	5.3	4.59	4.45	5.34	3.53	3.25	3.08
17	4.02	3.51	4.65	8.2	7.4	5.4	4.54	4.38	5.06	3.47	3.11	3.06
18	4.15	3.80	4.35	10.2	7.0	5.35	4.51	4.29	4.80	3.51	3.39	3.05
19	4.06	3.74	4.35	11.8	6.5	5.3	4.48	4.18	4.50	3.46	3.37	3.04
20	3.80	3.62	5.45	10.8	6.0	5.3	4.44	4.12	4.24	3.55	3.33	3.08
21	3.60	3.55	6.4	8.1	5.5	5.35	4.37	4.03	4.05	3.93	3.27	3.31
22	3.50	3.48	7.1	6.9	5.05	5.1	4.30	3.91	3.84	3.84	3.20	3.66
23	3.42	3.43	6.7	6.5	4.85	4.9	4.24	3.84	3.66	3.57	3.13	3.80
24	3.36	3.40	6.2	6.0	4.9	4.75	4.80	3.82	3.58	3.45	3.07	3.58
25	3.32	3.39	5.9	6.0	5.8	4.6	5.21	3.78	3.48	3.37	3.07	3.44
26	3.32	3.38	5.6	5.8	6.6	4.55	5.16	3.78	3.40	3.34	3.03	3.40
27	3.48	3.36	5.35	5.6	6.2	4.6	5.08	3.82	3.32	3.30	2.99	3.60
28	3.59	3.35	5.15	5.5	5.7	4.6	6.12	3.78	3.25	3.25	2.98	3.97
29	3.45	3.32	5.1	5.6	....	4.48	8.48	3.74	3.17	3.19	2.98	3.90
30	3.37	3.32	7.0	5.8	....	4.42	7.98	4.22	3.10	3.13	2.99	3.78
31	3.30	....	7.3	....	....	4.37	....	4.34	....	3.07	3.15	....

Note.—River partly frozen over Dec. 14 and 15; complete ice cover Dec. 16-18. Gage read to top of ice Dec. 26. Gage was stolen Aug. 4 and replaced Aug. 15: record missing.

TOPOGRAPHIC FEATURES.

The topography of Fayette is very similar to that of the central belt of counties in the southern half of the State, in that the surface features of the northwest half of the County show a regular succession of high sharp ridges, separated by deeply indented and V-shaped valleys. In the southeastern half, erosion has not progressed nearly so far as may be readily seen on Map I. Here occurs a high, partially dissected plateau, ranging in elevation from 1850 feet above sea-level in the Fayetteville region to 3150 feet, 2 miles southwest of Rainelle. As mentioned at the beginning of this Chapter, evidence is not lacking for the ancient Cretaceous peneplain. This base-leveled condition, which had an elevation of about 1000 feet above sea-level at the Ohio River and 1400 feet at Charleston, is represented by the crests of the highest ridges and hills along the Kanawha-Fayette County Line which have an elevation of about 2000 feet, rising southeastward to about 2500 feet at Parral and Herberton and 3050 feet at Maywood and Goddard Knob on the eastern border.

In the eastern half of the County there appear to be marked indications or remnants of the Tertiary peneplain mentioned at the beginning of this Chapter. These base-leveled surfaces have approximately the same elevation above sea-level along northeast-southwest lines as shown below at the points named:

	Elevation. Feet.
Carnifex Ferry and Fayetteville	1850
Clifty and Oakhill	2000
Pittman, Danese and Backus	2650

The elevation of this peneplain appears to have been 500 to 600 feet below the Cretaceous peneplain mentioned above.

The deep gorges cut by the Kanawha, New, and Gauley Rivers have already been discussed, the bed of the first-mentioned stream having an elevation of slightly less than 600 feet above sea-level at the Fayette-Kanawha County Line. Sewell Mountain and Walnut Ridge along the southeast border of Sewell Mountain District are the highest mountain ranges, the crests of Myles, Ford, and Walnut Knobs attaining an elevation of 3375 feet above sea-level. Other mountain ridges that have attained sufficient elevation and importance to warrant naming on Map I are Gauley Mountain and Dogwood Ridge in Falls District; Paint Mountain along the southeast borders of Kanawha and Fayetteville Districts; Packs and Garden Ground in the latter area; and Mann, War Ridge, Patterson, Fork, and Turniphole in Quinnimont District. With the exception of Mann Mountain, direct structural influence has apparently played a small part in their formation, their present summits being largely upheld by more resistant layers of the rock strata. The last mentioned is largely an anticlinal fold, since its axis corresponds closely with that of the Mann Mountain Anticline described on a subsequent page in Chapter III.

PART II.

Geology.

CHAPTER III.

STRUCTURE.

Structure is that phase of geology which treats of the pitch or lay of the stratified rocks, the methods used in representing it on maps and the definition of terms having already been given by the writer[1] in previous County Reports for the State Geological Survey.

METHOD USED IN REPRESENTING STRUCTURE.

The contour method of representing structure has been used on Map II accompanying this Report, since there is an absence of intense folding resulting in "overturns" in the rock strata. This method consists in showing by means of contour lines the elevation above sea-level of a definitely recognized stratum or "key-rock", the results being determined either by observations directly on it or by its known interval above or below other identified members of the rock column. In Fayette County it was found more feasible to base the contours on two different "key-rocks"; viz. the **No. 2 Gas** and **Sewell Coal beds**, as these are both widely persistent and definitely correlated in certain portions of the area. It was

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Ray V. Hennen, Marshall-Wetzel-Tyler Report, pp. 59-60; 1909.

found advantageous to use the former bed in that region lying northwest of the 1300-foot level of the Sewell Coal. All that area to the southeast of this level was based on the latter bed. The elevation of these coals above sea-level, as also the area covered by each set of contours, is shown in detail on Map II which accompanies this Report in a separate atlas—the **green** lines for the No. 2 Gas Coal, and the **red** for the Sewell. In each set the contour interval is 50 feet, which makes it possible to determine the approximate position of any stratum at any point by a liberal use of the two tables of intervals given below. By far the greater number of elevations on rock exposures and wells were determined with aneroid, these being checked on known spirit-level elevations. In localities where one or both of the coals were below drainage or could not be found in the hills, observations were taken on other known members of the strata and the true position of the "key-rocks" determined by intervals.

These intervals between known members of the rock column are not constant over a very large portion of the county, due to the rapid thickening of the measures both southeastward and southwestward; hence, instead of using constant intervals between the No. 2 Gas Coal and other known members, and likewise for the Sewell, in determining the final position of the contour lines on Map II, a series of intervals for different localities in the area had to be devised. The first of the two following tables gives the intervals in feet above and below the No. 2 Gas Coal to the other members named in the left-hand column for the points designated. The second table in a similar manner gives the same information for the Sewell Coal. The interval—1450 feet—between these "key-rocks" at Herberton is practically the same as that which prevails in the northwest portions of Wyoming and McDowell Counties, as shown on page 35 of the author's Report for the latter area, where the Pottsville Series attains its greatest development in the State:

Intervals Above and Below No. 2 Gas Coal.

Formations.	North Point of Fayette County. (Bore Hole No. 1 on Map II).	Martling.	Montgomery.	Mt. Carbon.	Powellton.	Page.	Hickory Camp.	Kingston.	Potato Hill Knob.	Herberton.	Parral.	Kanawha Falls.	Ansted-Hawks Nest.	Wyndal-Vanetta.	Peters Creek, 0.7 Mi S. of Mouth.	Mulvane.	Dogwood Ridge.	Carnifex Ferry.
Upper Kittanning Coal	830	880	810	....	995	1000	1000	1015	....	....	....	....	900	890	890	....	....	....
Upper East Lynn Sandstone, top	825	875	810	....	990	990	990	1005	....	....	....	....	895	885	885	....	....	....
North Coalburg—Middle Kittanning Coal	760	810	750	....	920	920	920	935	....	....	....	....	815	805	805	....	....	....
East Lynn Sandstone, top	755	805	750	805	915	915	915	930	....	....	925	800	810	800	800	....	....	....
No. 5 Block Lower Kittanning Coal	680	730	685	745	815	815	815	830	865	875	825	735	715	700	700	....	....	....
Kanawha Black Flint	600	650	620	675	730	730	730	715	765	775	740	665	640	620	620	....	....	....
Stockton Coal	590	640	610	665	720	720	720	705	760	770	730	655	625	615	615	....	....	....
Coalburg Coal	490	540	510	565	620	610	610	620	700	710	620	555	500	550	550	....	....	....
Winifrede Coal	390	440	410	465	520	515	515	525	575	585	525	455	430	450	450	450	....	....
Chilton Coal	280	330	300	350	440	390	390	380	400	410	400	340	350	340	340	340	....	....
Alma Coal	40	40	40	50	55	50	50	60	90	80	75	40	60	60	50	50	....	....
Peerless Coal	20	20	15	25	10	5	....	....	25	35	40	20	40	25	30	30	....	....
No. 2 Gas Coal	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Powellton Coal	35	45	40	45	65	55	110	100	65	75	50	45	60	50	40	50	50	....
Eagle Coal	130	140	120	140	160	155	180	225	190	250	170	130	135	135	90	150	140	130
Little Eagle Coal	150	165	140	165	190	200	200	230	220	....	210	155	170	160	140	195	190	170
Eagle Limestone and Shale	230	240	220	240	240	280	280	335	320	400	300	230	240	225	230	260	250	240
Lower War Eagle Coal	....	....	....	250	285	340	340	395	440	500	400	275	260	250	245	270	265	260
Glenalum Tunnel Coal	....	....	275	270	340	390	390	450	500	565	485	340	345	340	300	330	325	320
Gilbert Coal	....	....	....	360	440	450	450	530	580	700	585	440	405	400	375	390	390	370
Douglas Coal	....	....	....	400	500	510	505	600	....	785	690	500	500	470	425	475	455	430
Lower Douglas Coal	....	....	....	440	560	610	605	745	....	930	....	555	580	555	475	555	515	495
Upper Nuttall Sandstone, top	....	....	510	525	565	615	615	760	....	915	790	560	585	560	480	560	520	500
Lower Nuttall Sandstone, top	....	....	....	....	665	715	700	860	....	1045	930	640	710	660	600	660	620	600
Hughes Ferry (Iaeger) Coal	....	....	....	....	765	835	785	930	....	1140	1020	730	840	....	700	760	720	700
Harvey Sandstone, top	....	....	....	....	....	....	....	975	....	1155	1030	....	....	....	....	....	....	....
Castle Coal	....	....	....	....	....	....	....	....	....	....	....	....	915	....	....	....	....	....
Guyandot Sandstone, top	....	....	....	....	....	....	....	1040	....	1240	1140	....	920	....	770	....	....	830
Sewell "B" Coal	....	....	....	....	....	....	....	....	....	1340	1245	....	1015	....	....	....	....	920
Sewell Coal	....	....	900	....	....	1060	....	1165	....	1450	1335	935	1030	....	900	....	1000	980
Upper Raleigh Sandstone, top	....	....	....	....	....	....	....	....	....	....	....	....	....	....	925	....	....	....
Little Raleigh Coal	....	....	1025	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Beckley Coal	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Fire Creek Coal	....	....	....	....	....	....	....	1500	....	....	....	....	....	....	....	....	....	....
No. 6 Pocahontas Coal	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Pottsville Series, base of	....	1165	1165	....	1505	....	....	1860	....	....	....	....	....	....	....	....	....	....
Big Injun Sand, top	....	2035	1925	....	2440	....	....	2440	....	....	....	....	....	1850	....	....	....	....

Intervals Above and Below Sewell Coal.

Formations.	Carnifex Ferry.	Faylas (Miller).	Russellville.	Winona.	Nuttallburg.	Thurmond.	Parral.	Lively—1 Mi. N. E.	Herberton.	Boring No. 77 on Map II.	Macdonald—Boring 79A on Map II.	Terry.	Grandview.	Lawton.	Danese.	Rainelle—1 Mi. N. W.	Meadowbridge—1.5 Mi. N. W.	Meadow Creek—1.5 Mi. North.
No. 2 Gas Coal	980	980	1010	....	1070	....	1335	....	1450	1450	1450	....	....	....	....	....	....	....
Eagle Coal	850	850	880	....	935	....	1165	....	1200	1200	1200	....	....	....	....	....	....	....
Eagle Limestone and Shale	740	740	770	....	830	....	1035	....	1050	1050	1050	....	....	....	....	....	....	....
Gilbert Coal	610	610	640	640	620	610	750	660	750	750	750	....	....	....	....	....	....	....
Douglas Coal	550	550	580	580	560	550	645	560	665	650	650	....	....	....	....	....	....	....
Lower Douglas Coal	485	485	505	505	485	475	550	485	520	520	520	....	....	....	....	....	....	....
Upper Nuttall Sandstone, top	480	480	500	500	480	470	545	475	505	510	510	....	....	....	500	500	....	....
Lower Nuttall Sandstone, top	380	380	400	400	380	370	405	375	405	410	410	....	....	....	400	400	....	....
Hughes Ferry (Iaeger) Coal	280	275	290	300	280	270	315	250	310	300	300	....	....	....	290	290	....	....
Harvey Sandstone, top	240	235	250	235	240	230	280	200	290	270	270	....	....	....	250	250	....	....
Castle Coal	150	160	170	130	130	130	200	110	215	205	205	....	....	....	180	180	....	....
Guyandot Sandstone, top	145	155	160	125	125	125	195	100	210	200	200	....	....	....	175	175	....	....
Sewell "B" Coal	60	....	90	....	....	....	....	....	....	80	....	....	....	....	120	120	....	....
Sewell Coal	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Welch Coal	....	20	....	....	....	....	....	....	....	....	....	....	....	35	35	35	35	35
Upper Raleigh Sandstone, top	....	25	60	60	60	75	75	75	75	45	75	70	70	70	70	70	70	70
Little Raleigh Coal	....	....	180	180	130	145	145	145	145	160	140	160	160	165	155	160	160	160
Lower Raleigh Sandstone, top	....	....	185	185	135	150	150	150	150	165	145	165	165	170	170	170	170	170
Beckley Coal	....	....	280	215	200	215	200	200	200	250	235	260	260	260	260	250	250	250
Fire Creek Coal	....	....	370	325	300	325	300	300	300	315	325	385	385	400	390	390	390	390
Little Fire Creek Coal	....	....	410	350	325	350	325	325	325	340	350	410	410	415	405	400	400	405
Pineville Sandstone, top	....	....	420	360	335	360	335	335	....	350	355	415	415	420	420	405	405	410
No. 6 Pocahontas Coal	....	....	480	....	....	....	....	....	....	460	440	570	570	570	550	540	570	570
No. 4 Pocahontas Coal	....	....	....	....	....	....	....	....	....	480	....	620	620	640	610	610	610	620
No. 3 Pocahontas Coal	....	....	....	....	525	600	....	....	....	540	....	680	680	680	650	650	650	660
Pottsville Series, base of	....	....	....	....	....	800	....	520	....	590	....	800	890	900	....	800	810	775
Princeton Conglomerate, top	....	....	....	....	....	....	....	....	....	....	....	1070	1110	....	....	....	1170	1140

The sections and well records from which the intervals in the accompanying tables were determined are published on subsequent pages and referenced by localities in the Index. In order to determine the approximate position of a coal bed or any other member of the rock column in any region, subtract or add, as the case may be, its interval for that locality above or below the "key-rock" from the elevation of the latter as shown by the structure contours for the point in question. If the formation is not listed in the accompanying tables, then its interval may possibly be found from its known position to a listed member or in a local section.

DETAILED STRUCTURE.

General Features.

As shown by the structure contours on Map II, the rock strata have been only slightly disturbed by the upward or lateral movement of the earth's crust, since these have a general rise to the southeast at a very low angle with the horizontal from the northwest boundary of Fayette to the southeast border of the County, accentuated slightly by the Mann Mountain, Ravenseye, and Boggs Knob Anticlines and depressed by the Clifftop, Lawton, and Springdale Synclines. Over a large portion of its area the pitch is so low that even on the steepest structural slopes the dip of the rocks is barely perceptible to the eye. The lowest point structurally is at the common corner of Fayette, Kanawha, Clay, and Nicholas Counties, where the No. 2 Gas Coal has descended to only 590 feet above the sea-level; and the highest is at the extreme southeastern point of Quinnimont District, where the Sewell Coal has risen to slightly over 3700 feet above sea-level. At the latter point the No. 2 Gas Coal should belong about 1500 feet higher, or at an elevation of 5200 feet, making the total structural relief 4610 feet between the two extremes in an air-line distance of 39 miles—a general rise to the southeast at the rate of 119 feet to the mile. This rate is much exceeded at several points along the line between these two points, since the three comparatively shallow synclines above mentioned intervene.

On the whole the structure, as represented on Map II, harmonizes fairly well with that shown on maps previously issued by the State Gelogical Survey for adjoining counties, except that the **Wake Forest Anticline** of Krebs[2] has apparently died out to the northeast before reaching the main valley of Paint Creek in the Burnwell-Greencastle region.

Description of Folds.

A glance at Map II shows that the general strike of the strata runs in a northeast-southwest direction and that the rocks have a general rise to the southeast that is interrupted by the six following folds which attain sufficient prominence to warrant description:

Anticlines.	**Synclines.**
Mann Mountain.	Clifftop.
Ravenseye.	Lawton.
Boggs Knob.	Springdale.

Mann Mountain Anticline.—The Mann Mountain Anticline, not previously described in the State Survey Reports, is the most pronounced upward fold in the county, and it has been so named by the writer from the mountain along the axis of which it attains its greatest development. The axis of the fold enters Fayette from Nicholas County near the mouth of Beech Run of Gauley River, 1¼ miles southwest of the mouth of Peters Creek; bears S. 30° E. for about 12 miles to a point ¾ mile southeast of Divide; and veers to an almost due south course for 8¾ miles to its apex on the summit of Mann Mountain, 2 miles north of Gentry, where it changes to a southwest course for 3 miles to a point 0.7 mile northwest of Greenwood. From the latter point it again resumes an almost due south course, crossing New River into Raleigh County at Glade beyond which it apparently dies out in the general southeast rise of the strata.

Along the crest of this fold the surface rocks belong in the basal half of the Kanawha, and in the New River and Pocahontas Groups of the Pottsville Series, and in the Mauch Chunk division of the Mississippian. At the Nicholas-Fayette

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[2] C. E. Krebs, Geologic Map, Kanawha County Report; 1913.

Line, as shown on Map II, the No. 2 Gas Coal has an elevation of about 1750 feet above sea-level. Southeastward from this point the axis rise rapidly to a point ¾ mile south of Ramsey, bringing the latter coal up to 2300 feet and the Sewell bed, to 1300 feet above the same datum. Beyond this point the rise continues rapidly to the southeast along the crest of the dome-like structure, 2 miles slightly west of north from Gentry, bringing the latter coal to about 3120 feet above sea-level. Southwestward from this apex the axis dies down gradually, bringing the Sewell Coal down to 2950 feet, ½ mile northwest of Greenwood, and 2850 feet above the same datum at Laurel Creek. From the latter point the axis again resumes its southward rise, bringing the latter bed to an elevation of 2950 feet above sea-level at its intersection with New River.

Northward from Laurel Creek the axis of the Mann Mountain Anticline practically coincides with the divide between the drainage of Gauley and New Rivers, with the exception of Manns Creek. This leads to the conclusion that the formation of this fold was probably contemporaneous with the upheaval of the floor of the Appalachian Basin at the close of the Carboniferous, or not later than the crustal movements that immediately followed the formation of the Cretaceous peneplain described in the preceding Chapter.

Clifftop Syncline.—The Clifftop Syncline, not previously described in the State Survey Reports, is a shallow downward fold lying immediately on the east side of the anticline last discussed. It has been traced northward by the author to a point ½ mile east of Keslers Crosslanes in Nicholas County. From this point it bears southward, crossing Gauely River ⅓ mile east of Carnifex Ferry, and follows closely the valley of Meadow River to Shawvers Bridge near the mouth of Hedricks Creek. From this point the axis bears S. 15° E. for 6 miles to a point 1½ miles southwest of Russellville, where it veers to a course about S. 15° W. through the village of Clifftop from which it has been named. From this place it continues the same course to its southwest terminus, 1 mile southwest of Landisburg.

Along the axis of this fold the surface rocks belong exclusively in the Kanawha and New River Groups of the Pottsville

Series. One-half mile eastward from Keslers Crosslanes, as shown on Map II, the No. 2 Gas Coal has an elevation of about 2060 feet above sea-level. Southward along the axis of the Clifftop Syncline this coal rises gradually, bringing it up to 2300 feet, slightly over a mile south of Carnifex Ferry, and the Sewell Coal, to 2300 feet above the same datum. The axis continues its southward rise, bringing the latter coal up to 2000 feet, 2 miles southwest of Russellville; 2350 feet, at Clifftop; and 2750 feet, 1 mile southwest of Landisburg. The formation of this fold was synchronous with that of the Mann Mountain Anticline, or probably near the close of Carboniferous time.

Ravenseye Anticline.—The Ravenseye Anticline, not previously described in State Survey Reports, is a spur jutting off to the northeast from the high dome on the Mann Mountain arch, 2 miles northward from Gentry. From this point its axis extends North 30 to 35 degrees East for 11 miles, apparently terminating about 2 miles northeast of Corliss at Meadow River on the Fayette-Greenbrier County Line. It passes about one-half mile east of Ravenseye Post-office, from which point it has been named.

The surface rocks along the crest of this fold belong exclusively in the New River and Pocahontas Groups of the Pottsville Series. At its southwest terminus the Sewell Coal has an elevation of about 3120 feet above sea-level, as shown on Map II. Northeastward from the latter point, the axis dips rapidly for 2½ miles, bringing the latter coal down to 2750 feet just beyond Glade Creek, where it flattens considerably and brings the same coal down to about 2550 feet above sea-level, 1 mile northeast of Corliss. Its age is probably contemporaneous with that of the Mann Mountain arch previously described.

Lawton Syncline.—This downward fold in the rocks, lying immediately on the east of the anticline last described, has its apparent northeastern terminus near the Fayette-Greenbrier Line, slightly over a mile northeast of Corliss. From this point its axis bears southwestward roughly parallel with that of the Ravenseye Anticline, crossing Laurel Creek, 2.4 miles eastward from Landisburg; Smoky Branch, 0.7

mile northwest of Danese; and the Sewell Mountain-Quinnimont District Line, 1 mile southeast of Gentry. From the latter point it continues its southwest course closely along the valley of Laurel Creek and practically dies out near the crest of the Mann Mountain Anticline. Since this fold has not been previously described, it is herein named the Lawton Syncline from the mining town on the last-mentioned stream through which it passes.

The surface rocks along the axis of this fold belong exclusively in the New River and Pocahontas Groups of the Pottsville Series, and in the top portion of the Mauch Chunk Series of the Mississippian. At its northeast terminus the Sewell Coal has an elevation of about 2550 feet above sea-level, as shown on Map II. Southwestward from this point the axis rises gradually, bringing the latter coal up to about 2690 feet above the same datum at Laurel Creek, 1 mile northwest of Danese. It continues to rise in the same direction, but much more rapidly for 4 miles, into a saddle-like structure on the Sewell Mountain-Quinnimont District Line, bringing the same coal to about 2870 feet. From this point it flattens slightly southeastward, carrying the Sewell Coal down to about 2850 feet at its southwest terminus near Laurel Creek Station. The formation of this fold is evidently synchronous with that of the Ravenseye Anticline above described.

Boggs Knob Anticline.—This upward fold in the rocks enters Fayette from Greenbrier County just southwest of Boggs Knob, and since it has not been previously described, it is herein designated as the Boggs Knob Anticline. From the point where it enters the former county its axis bears southwestward, crossing Sewell Creek, 0.8 mile northward from Springdale; and the Fayette-Summers County Line, ½ mile southward from Meadowbridge (Clute P. O.).

The surface rocks along its crest belong exclusively in the New River and Pocahontas Groups of the Pottsville Series and in the Mauch Chunk Series of the Mississippian. At the summit of Boggs Knob on its axis the horizon of the Sewell Coal has an elevation of about 3675 feet above sea-level. Southwestward to a point ¾ mile northeast of Medowbridge, its axis is almost horizontal, and between the latter point and the Summers County Line there is a dip of slightly less than 50 feet. The fold is non-symmetrical about its axis as is shown on Map II by the rapid dip prevailing on its northwestern flank as compared to the slight reversal on its southeastern slope. Its age is probably synchronous with that described for the Mann Mountain arch on a preceding page of this Chapter.

Springdale Syncline.—The very shallow downward fold in the rocks, lying immediately on the southeast of the anticline last described, enters Fayette from Greenbrier County slightly less than a mile northwest of the summit of Turniphole Mountain and extends southwest approximately parallel with the axis of the Boggs Knob Anticline, leaving the former county near the common corner of Fayette, Summers, and Greenbrier Counties. It is so shallow that the location of its axis on Map II is more or less uncertain, due to lack of sufficient data to definitely define it. As this fold has not been previously described it is herein designated the Springdale Syncline from the village near which it passes.

The surface rocks along this basin are the same as described for the crest of the Boggs Knob Anticline, the axis of the syncline being practically horizontal along that portion of it at least that is included within the territory of this Report, the horizon of the Sewell Coal having an elevation of about 3630 feet above sea-level. Its age is synchronous with that of the anticline last described.

Minor Anticlinal Spurs.—There are two short anticlinal spurs outlined by the contours on Map II that are worthy of mention. One extends northward from Dogwood Creek in Falls District to a point slightly less than one mile northwest of Keslers Crosslanes, roughly parallel and 1 to 1½ miles west of the axis of the Clifftop Syncline. This may develop northward into a more pronounced fold in Nicholas County. The other is a still shorter anticlinal spur extending westward from near Thayer to McKendree, and thence southwestward to the Fayette-Raleigh County Line, 1.4 miles westward from New River. Neither of these folds appears to attain sufficient importance to warrant naming them.

Unconformities and Absence of Faults.

Slight local unconformities, revealed by the temporary absence of coal beds and sandstone ledges, occur at many localities within the area. These, however, are rather limited in extent and do not warrant description. The evidence in other portions of the State is further corroborated in Fayette that there is a marked unconformity at the junction of the Pottsville Series with that of the Mauch Chunk. That a considerable period of time elapsed from the close of the latter period before the deposition of Pottsville sediments was begun, is evidenced by the marked contrast in the conditions accompanying sedimentation, the soft, red shales of the former being succeeded by the heavy, coarse, gray to grayish-white and current-bedded sandstones and coal seams of the former.

There appears to be a complete **absence of faults** in the territory of this Report, as no marked displacements of the rock strata were observed.

CHAPTER IV.

STRATIGRAPHY.

GENERAL AND SPECIAL SECTIONS.

INTRODUCTION.

The surface rocks of Fayette County, with the exception of the Quaternary sands, gravel, and clay along the larger stream valleys, are all of Paleozoic Age, only the Pennsylvanian and Mississippian Periods being represented. There is some evidence available, however, through several scattered oil and gas well borings in the western half of Fayette and in the adjoining County of Summers on the east, of the thickness and character of the underground strata, including the rocks of the basal portion of the Mississippian and Upper Devonian Periods.

The following table gives the generally accepted classification of the rocks available for study, with minimum and maximum thicknesses in feet of the formations designated, the former dimension prevailing in the northwest margin of the area, and the latter, in the southeast border:

Age.	**Period.**	**Series.**
Quaternary	Recent.	Present Surface Formation.
Paleozoic (3850-7145′)	Pennsylvanian (2050-3470′)	Allegheny (200-200 feet)
		Pottsville (1850-3270 feet)
		Kanawha Group (1100-1875 feet)
		New River Group (600-920 feet)
		Pocahontas Group (50-475 feet)
	Mississippian (1100-3075′)	Mauch Chunk (500-2500 feet)
		Greenbrier Limestone (150-950 feet)
		Pocono Sandstones (450-625 feet)
	Devonian (700′)	Catskill (700 feet)

The Quaternary rocks are represented by clays, sand, and gravel deposited along the valley floors of the rivers and creeks, as shown by an appropriate symbol on Map II. The same map shows that the Allegheny Series of the Pennsylvanian is confined to near the summits of the high hills and ridges in the northwest portions of Falls and Kanawha Districts, only the basal two-thirds of the formation being represented at probably the maximum thickness of the beds left uneroded.

However, the great bulk of the surface rocks belong in the Pottsville Series of the Pennsylvanian, all the three groups—Kanawha, New River, and Pocahontas—being represented and succeeding each other in the order named southeastward across the area.

GENERAL SECTIONS.
ALLEGHENY, POTTSVILLE, AND MAUCH CHUNK SERIES.

Practically the entire upper third of the Allegheny Series has been eroded in Fayette County, only the members below the upper division of the Lower Freeport Sandstone being observed. The following general section of the entire series, republished from pages 228-229 of the Braxton-Clay Report of the State Survey and the maximum thicknesses of members determined by the writer in southern Clay County, is probably representative of the Allegheny measures as once present in the territory of this Report:

General Section of the Allegheny Series.

	Thickness. Feet.	Total. Feet.
Coal, Upper Freeport, medium-soft, multiple-bedded	0 to 5	5
Fire clay shale, Bolivar	0 to 5	10
Limestone, Upper Freeport, lenticular, frequently replaced with 6″ to 12″ of **"Kidney" Iron Ore, Upper Freeport**	0 to 5	15

	Thickness. Feet.	Total. Feet.	
Sandstone, Upper Freeport, massive, coarse, conglomeratic, gray to grayish-brown, with large white and bluish-black quartz pebbles ¼″ to 2″ in diameter, forms great cliffs along Elk River, and is an important "key-rock"	50 to 68	83	
Coal, Lower Freeport, medium-soft, irregular, lenticular........................	0 to 2	85	85′
Fire clay shale and shale, sandy, with 5″ to 10″ of **"Kidney" Iron Ore, Lower Freeport**............................	10 to 15	100	
Sandstone, Lower Freeport, massive, coarse, grayish-brown, prominent cliff-maker in western Clay, where it is quite pebbly........................	25 to 32	132	
Coal, Upper Kittanning "Rider," mostly bony cannel and a split off the Upper Kittanning proper....................	1 to 3	135	
Shales, sandy............................	0 to 25	160	
Coal, Upper Kittanning, medium-soft, multiple-bedded, same bed as mined commercially at Queen Shoals on Elk River................................	2 to 5	165	80′
Sandstone, Upper East Lynn, massive to current-bedded, medium-grained to coarse and conglomeratic, large quartz pebbles, great cliff rock...............	50 to 77	242	
Coal, Middle Kittanning, "North Coalburg," multiple-bedded, medium-hard, with both gas and semi-splint layers, same bed as once mined commercially at North Coalburg..................	0 to 8	250	85′
Sandstone, East Lynn, massive to current-bedded, medium-grained, seldom pebbly, forms great cliffs................	25 to 67	317	
Coal, Lower Kittanning, "No. 5 Block", "Roaring Creek," multiple-bedded, hard block and splinty, with softer gas layers, same bed as long mined commercially near Montgomery..............	4 to 8	325	75′
Sandstone, Kittanning....................	0 to 22	347	
Coal, Clarion, medium-soft...............	0 to 3	350	25′
Sandstone, Homewood, "Roaring Creek".			

The investigations of the author in Fayette County during the field season of 1916 revealed the important fact that the Douglas and Lower Douglas Coal beds of Wyoming and McDowell Counties belong in the Kanawha Group instead of the New River division of the Pottsville Series as shown by the author in the general section of the latter formation on page 55 of the State Geological Report for the latter area; and that the Upper Nuttall Sandstone should correlate with the conglomeratic Panther Sandstone shown in the same section at the top of page 56 of the last-mentioned Report. This would add 270 feet to the 1830-foot total for the Kanawha Group in Wyoming and McDowell, or a final total of 2100 feet. A corresponding amount would have to be subtracted from the total of 1300 feet shown for the New River Group in the same section, thus leaving only 1030 feet for the latter formation in these two counties, a figure that is only about 100 feet greater than the maximum thickness of the same group in Fayette County. Since the maximum development of the Kanawha Group in the latter area is only about 200 feet less than its thickness in Wyoming and McDowell where the Pottsville Series attains its maximum development in the State, the section last mentioned above is republished below with some modifications from pages 51-60 of the Report for the latter area to represent not only Fayette but also the southern half of the State and at the same time correct the former error as to the dividing line between the Kanawha and New River Groups in the Wyoming-McDowell area. The error was a very natural one to make, owing to the absence of direct tracing of the Nuttall Sandstone from the New River region southwestward and of conglomerate sandstones in the Kanawha Group of the Pottsville along the Kanawha Valley, thus leading to the erroneous conclusion that the conglomeratic Dotson Sandstone of Campbell[1] should represent the Nuttall Sandstone or true top member of the New River Group.

General Section of Pottsville Series for Southern Half of West Virginia.

	Thickness. Feet.	Total. Feet.
Kanawha Group (2100 feet):		
Sandstone, Homewood, massive, grayish-white, cliff maker............	75 to 95	95
Coal, Stockton "A", multiple-bedded, splinty, slaty......................	0 to 5	100

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[1] M. R. Campbell, Tazewell Folio No. 44, U. S. Geol. Survey; 1898.

	Thickness. Feet.	Total. Feet.	
Kanawha Black Flint, bluish-black and cherty in Fayette, a marine fossil zone	0 to 10	110	
Coal, Stockton, multiple-bedded, splinty, mined extensively in the Kanawha Valley	0 to 10	120	120′
Shale, sandy, with impure fire clays	25 to 50	170	
Sandstone, Upper Coalburg, coarse, massive, gray, often weathering into "chimney rock" columns on hill summits and points	50 to 80	250	
Shale	5 to 10	260	
Coal, Coalburg, multiple-bedded, splinty layers, mined extensively in Kanawha Valley and in Mingo County	2 to 10	270	150′
Fire clay, impure, sandy shales	0 to 20	290	
Coal, Little Coalburg, splinty, not mined commercially in State	0 to 3	293	
Fire clay, impure, sandy shale, with thin **coals**	0 to 22	315	
Sandstone, Lower Coalburg, often forms great cliffs	20 to 40	355	
Shale, sandy	5 to 9	364	
Coal, Buffalo Creek, multiple-bedded, hard, mined commercially in Mingo County	0 to 6	370	100′
Fire clay and shale	35 to 55	425	
Limestone, Buffalo Creek (Winifrede?), hard, gray, lenticular, with **marine fossils** on Island Creek, Logan County, and at Rawl, Mingo County	0 to 2	427	
Sandstone, Upper Winifrede, massive, yellowish-gray	20 to 30	457	
Shale	2 to 3	460	
Coal, Winifrede, multiple-bedded, hard, splinty, mined extensively in Kanawha Valley	1 to 10	470	100′
Fire clay, impure, and sandy shale	0 to 20	490	
Coal, Lower Winifrede, multiple-bedded, splinty	0 to 2	492	
Sandstone, Lower Winifrede, massive.	10 to 23	515	
Shale	1 to 2	517	
Coal, Chilton "A", multiple-bedded, not mined commercially in State	0 to 3	520	50′
Fire clay, impure, and shale, (probable horizon of **marine fossiliferous Winifrede Limestone** of Winifrede Creek, Kanawha County, and Indian Gap, Raleigh County)	10 to 18	538	
Sandstone, Upper Chilton, massive, medium-grained, micaceous	20 to 40	578	
Coal, Chilton "Rider", splinty, multiple-bedded, upper portion of seam mined extensively on Spruce Fork, Logan County	0 to 4	582	

	Thickness. Feet.	Total. Feet.	
Fire clay shale	0 to 20	602	
Coal, Chilton, multiple-bedded, splinty, lower portion of bed mined extensively on Spruce Fork, Logan County, and same as mined on Dingess Run and Buffalo Creek, same county	1 to 8	610	90′
Fire clay, impure, and shale	0 to 5	615	
Sandstone, Lower Chilton, massive	0 to 30	645	
Coal, Little Chilton, double-bedded, split off seam mined on Dingess Run and Rum Creek, Logan County	0 to 2	647	
Sandstone, Hernshaw, massive	20 to 49	696	
Coal, Hernshaw, multiple-bedded, mined on Lens Creek, Kanawha County, where it is known as the "**Black Band**" seam	0 to 4	700	90′
Fire clay and sandy shales	1 to 5	705	
Sandstone, Naugatuck	15 to 21	726	
Coal, Dingess, multiple-bedded, gas type, once mined commercially at Dingess, Mingo County, and may be same as Williamson Coal of Mingo County	1 to 4	730	30′
Shale	1 to 5	735	
Sandstone, Williamson	5 to 20	755	
Shale	1 to 5	760	
Limestone, Dingess, gray and hard, frequently brown and siliceous, lenticular and ferriferous, with **marine fossils,** widely persistent in Kanawha, Fayette, Nicholas, Boone, Logan and Mingo Counties	0 to 2	762	
Shale, dark-green, sandy, with iron ore nodules and plant fossils	0 to 30	792	
Coal, Williamson, multiple-bedded, splinty, mined commercially at Williamson, Mingo County, and at Auburn, Kentucky	1 to 8	800	70′
Fire clay, impure, and shale	1 to 5	805	
Sandstone, Upper Cedar Grove	10 to 40	845	
Shales, dark-gray, with iron ore nodules and holding **marine fossiliferous Seth Limestone** of Boone County near base	20 to 50	895	
Coal, Cedar Grove, multiple-bedded, splinty; when normal, the base of upper bench is hard and splinty; and reverse is true of lower bench; mined extensively in Kanawha Valley; same as **Island Creek** seam; upper bench the **Red Jacket** or **Upper Thacker** bed of Mingo County	2 to 5	900	100′

	Thickness. Feet.	Total. Feet.	
Fire clay and shale	0 to 10	910	
Sandstone, Middle Cedar Grove, massive, frequently holding a thin **coal**	0 to 60	970	
Coal, Lower Cedar Grove, multiple-bedded, splinty at top, as is the lower bench of the **Cedar Grove** proper of Kanawha; also of the **Island Creek** bed of Logan; likewise the same as the **Lower Thacker** of Mingo County, where it is mined commercially	2 to 5	975	75′
Fire clay, impure, and shale	1 to 10	985	
Sandstone, Peerless, same as **Lower Cedar Grove** of the Reports for Logan-Mingo and Wyoming-McDowell areas	20 to 30	1015	
Coal, Alma "A", not mined commercially in State	0 to 1	1016	
Shale, dark-gray, with iron ore nodules and plant fossils	5 to 9	1025	
Coal, Alma, multiple-bedded, splinty layers, same as **Draper** bed of Logan County; mined extensively in Logan, Mingo, and Boone Counties	2 to 5	1030	55′
Fire clay, impure, and shale	0 to 5	1035	
Sandstone, Monitor, massive, bluish-gray, medium-grained, micaceous, same as the **Logan** of the Logan-Mingo County Report	20 to 40	1075	
Shale, sandy	1 to 5	1080	
Coal, Little Alma, multiple-bedded, slaty, not mined commercially in State	0 to 3	1083	53′
Sandstone, Lower Monitor, massive, micaceous, erroneously correlated with **Peerless** in Reports for Logan-Mingo and Wyoming-McDowell areas	15 to 29	1112	
Shale, sandy, gray and flaggy	1 to 5	1117	
Limestone, Campbell Creek, dark-gray, hard, siliceous, lenticular	0 to 2	1119	
Shales, flaggy and sandy, with iron ore nodules and plant fossils	10 to 20	1139	
Coal, Campbell Creek, multiple-bedded, gas type, includes both the **Peerless** and **No. 2 Gas** seams in Kanawha Valley, and **Warfield, Freeburn, Burnwell,** and **Upper War Eagle** beds of Mingo County, mined commercially over wide area in southern half of State	2 to 6	1145	62′
Sandstone, Lower Campbell Creek	0 to 30	1175	
Coal, Lower Campbell Creek, multiple-bedded, not mined commercially in State	0 to 4	1179	

	Thickness. Feet.	Total. Feet.	
Sandstone, Brownstown, massive, bluish-gray and brown, micaceous...	10 to 17	1196	
Coal, Powellton "A", double-bedded, not mined commercially in State.	0 to 1	1197	
Shale, sandy, flaggy, laminated.......	10 to 18	1215	
Coal, Powellton, multiple-bedded, both gas and splinty type, mined extensively in Fayette County, and same as **Hatfield Tunnel** seam of Mingo County....................	0 to 5	1220	75′
Shale, dark, laminated...............	10 to 20	1240	
Limestone, Stockton, "Cannelton", siliceous, lenticular, carrying **marine fossils** on Simmons Creek, Kanawha County......................	0 to 4	1244	
Shales, dark, with **marine fossils** in southeastern Boone and northern Wyoming Counties...............	25 to 34	1278	
Coal, Matewan, double-bedded, soft gas type, not mined commercially in State............................	0 to 5	1283	63′
Sandstone, Matewan, massive.........	20 to 37	1320	
Coal, Eagle "A", soft gas type, not mined commercially in State.....	0 to 2	1322	39′
Sandstone, Eagle, massive, coarse, gray and brown..................	20 to 37	1359	
Shale, carrying **fossil shells** on head of Little Cub Creek, near Botsford, Wyoming County, Dorothy in Raleigh, and Crescent in Fayette.	5 to 10	1369	
Coal, Eagle, both soft gas and semi-splint type, multiple-bedded, mined extensively in Fayette, Mingo, and McDowell Counties, and same as **Middle War Eagle** seam of Turkey Creek, Mingo, and **Mohawk** of western McDowell County.......	1 to 6	1375	53′
Fire clay, impure, and shale..........	0 to 5	1380	
Sandstone, Bens Creek...............	0 to 27	1407	
Coal, Bens Creek, multiple-bedded, soft, gas, columnar type, and apparently a split off the Eagle bed proper of Fayette County...............	0 to 3	1410	35′
Fire clay and shale...................	0 to 10	1420	
Sandstone, Decota, massive...........	0 to 57	1477	
Shale, carrying **marine fossils** at Oceana and northwest of Elklick, Wyoming County, and **brackish-water fossil fauna** at Smithers, Fayette.	0 to 9	1486	
Coal, Little Eagle, multiple-bedded, soft, gas, columnar type, once mined commercially near Parral, Fayette County; sometimes coalesces with Eagle seam on Paint Creek below Kingston in Fayette.	1 to 4	1490	80′
Sandstone, flaggy and shaly..........	0 to 20	1510	

	Thickness. Feet.	Total. Feet.	
Coal, Cedar, multiple-bedded, soft, gas type, once mined commercially at Cedar, Mingo County, and apparently a split off the Little Eagle proper of Fayette	0 to 4	1514	24′
Sandstone, Grapevine, making cliffs along N. & W. Ry. grade at mouth of Grapevine Creek in Mingo County	25 to 30	1544	
Shale, Eagle, dark to black, laminated, **marine fossils**	15 to 20	1564	
Limestone, Eagle, dark, brittle, lenticular, with **marine fossils** widely persistent from Kanawha River to Kentucky and Virginia line	0 to 2	1566	52′
Shale, Eagle, black, with iron ore nodules and **marine fossils**	10 to 25	1591	
Coal, Little Cedar, not mined commercially in State	0 to 1	1592	26′
Sandstone, Lower War Eagle, flaggy, micaceous	20 to 30	1622	
Slate, black, with plant fossils	5 to 10	1632	
Coal, Lower War Eagle, multiple-bedded, soft, gas type, not mined commercially in State	0 to 3	1635	43′
Shale	1 to 5	1640	
Sandstone, Upper Gilbert, massive, grayish, medium-grained, making cliffs opposite Gilbert, Mingo County	40 to 50	1690	
Shale, black, laminated, siliceous, with iron ore nodules; at Oceana, carrying the dark-gray, siliceous, lenticular **Oceana Limestone** (0″ to 24″) near top	5 to 15	1705	
Sandstone, bluish-gray to dark, laminated	5 to 15	1720	
Coal, Glenalum Tunnel, multiple-bedded, soft, gas, columnar type, much split up with slate partings 1 to 2 feet thick, not mined commercially in State	0 to 15	1735	100′
Sandstone, Lower Gilbert, massive, grayish-white to brown, lower of twin cliffs opposite Gilbert, Mingo County	50 to 79	1814	
Coal, Gilbert "A", multiple-bedded, soft, gas, columnar type, observed only in southwest edge of McDowell County	0 to 1	1815	
Shale, Gilbert, dark, flaggy, laminated, with **marine fossils** on Clear Fork, Wyoming County and at Mt. Carbon, Fayette, just above which belongs the **Dorothy ? Limestone** (0″ to 24″ thick)	40 to 5	1820	

	Thickness. Feet.	Total. Feet.	
Coal, Gilbert, multiple-bedded, soft, gas, columnar type, not mined commercially in State; important seam in western Wyoming County and in Fayette and Nicholas......	0 to 4	1824	
Shale, sandy, lenticular..............	0 to 6	1830	95′
Sandstone, Dotson, current-bedded, medium-grained to coarse, frequently pebbly, making great cliffs along N. & W. Ry. grade between War Eagle and Wyoming Station (formerly Dotson); same as **Bearwallow Conglomerate** of Tazewell Folio, U. S. Geological Survey; coarse, brown, and friable in Raleigh and Fayette................	75 to 125	1955	
Coal, Douglas "A", observed only in southern McDowell...............	1 to 0	1955	
Shale, sandy, lenticular..............	50 to 10	1965	
Coal, Douglas, generally single-bedded, soft, columnar type, mined commercially at Douglas Station, McDowell County, and same as **"Kidd"** seam of Herberton, Fayette...............................	1 to 5	1970	140′
Fire clay shale, sandy...............	0 to 5	1975	
Sandstone, Lower Dotson, heavy to current-bedded, sometimes conglomeratic, grayish-white to brown, friable, making great vertical cliffs along banks of Clear Fork and on down Guyandot River, to Justice in Wyoming County..............	50 to 100	2075	
Shale, Douglas, dark, sandy, laminated, with **marine** or **brackish-water fossil fauna** at base..............	5 to 15	2090	
Coal, Lower Douglas, multiple-bedded, soft, gas, columnar type, not mined commercially in State............	1 to 5	2095	
Shale, gray and sandy...............	1 to 5	2100	130′
New River Group (1030 feet)			
Sandstone, Upper Nuttall, massive to heavy and current-bedded, grayish-white to brown, conglomeratic in McDowell, where it forms cliff between Panther and Douglas Station, same as **Panther Sandstone** of Wyoming-McDowell Report....	100 to 50	2150	
Shale, dark, sandy...................	0 to 7	2157	
Coal, Iaeger "B", multiple-bedded, soft, gas, columnar type, observed only on headwaters of Panther Creek, McDowell County, not mined commercially.........................	0 to 3	2160	60′

	Thickness. Feet.	Total. Feet.	
Sandstone, Lower Nuttall, "Upper Iaeger", massive, medium-grained, gray to brown, making cliffs 175 feet above Tug Fork, at Iaeger, McDowell County	30 to 50	2210	
Coal, Iaeger "A", slaty and sulphurous, observed only on headwaters of Panther Creek, McDowell County	1.6 to 0	2210	50′
Shale, Upper Iaeger, dark, argillaceous, laminated, with plant fossils at base	5 to 60	2270	
Coal, Iaeger, generally double-bedded; soft, columnar, mined locally at Iaeger, McDowell, 100 feet above N. & W. Ry. grade, apparently same as **Hughes Ferry Coal** of Kanawha Valley	1 to 5	2275	65′
Shale, sandy	0 to 5	2280	
Sandstone, Middle Iaeger, massive, grayish-white, medium-grained to coarse, forms cliffs at Iaeger, McDowell	30 to 40	2320	
Coal, Lower Iaeger, double-bedded, soft, columnar, not mined commercially in State	0 to 2	2322	47′
Fire clay shale	0 to 3	2325	
Sandstone, Lower Iaeger, massive, gray and brown, medium-grained, micaceous	20 to 30	2355	
Shale, Lower Iaeger, dark-gray, argillaceous, laminated	20 to 35	2390	
Sandstone, Harvey Conglomerate, current-bedded to massive, conglomeratic, medium-grained to coarse, grayish-white to brown, lenticular, forms great cliffs near ridge summits, ½ mile southwest of Pando and ¾ mile N. 60° W. of English, McDowell County	125 to 25	2415	
Shale, Sandy Huff, dark-gray, argillaceous, laminated, cropping flush with N. & W. Ry. grade, just below mouth of Sandy Huff Branch, McDowell County	5 to 40	2455	
Coal, Castle, multiple-bedded, soft, columnar, irregular, not mined commercially	2 to 0	2455	133′
Sandstone, Guyandot, massive, current-bedded, often conglomeratic, medium-grained to coarse, lenticular, grayish-white, forms great cliffs in Fayette, Raleigh, Wyoming, McDowell, and Mercer Counties, and bed of New River at Gauley Station, C. & O. Ry., Fayette	0 to 75	2530	

	Thickness. Feet.	Total. Feet.	
Shale, sandy, and dark	0 to 5	2535	
Coal, Sewell "B", multiple-bedded, soft, columnar, attains minable dimensions only in southeastern Wyoming and McDowell Counties, erroneously correlated with Iaeger Coal on pp. 251-2 of Volume II(A)	0 to 5	2540	85′
Shale, sandy, flaggy, laminated	10 to 24	2564	
Coal, Sewell "A", double-bedded, soft, columnar, not mined commercially in State	0 to 1	2565	25′
Sandstone, Lower Guyandot, massive to current-bedded, medium-grained, grayish-white, lenticular, forms cliffs in Wyoming, McDowell, Raleigh, and Mercer Counties	0 to 50	2615	
Shale, Hartridge, dark, with plant fossils and in Fayette often carrying **fresh- or brackish-water fossil shells**	0 to 5	2620	
Coal, Sewell, generally double-bedded, soft, columnar, mined commercially in Fayette, Raleigh, and McDowell; in latter county known locally as **"Davy"** bed	0 to 10	2630	65′
Shale, gray, sandy, lenticular	40 to 5	2635	
Sandstone, Welch, massive to current-bedded, grayish-white, lenticular, forms great cliffs along Tug Fork between Welch and Roderfield and Dry Fork near Bradshaw, McDowell County	0 to 50	2685	
Shale, dark, argillaceous, lenticular	0 to 5	2690	
Coal, Welch, multiple-bedded, soft, columnar, mined commercially at Hemphill, Premier, Coalwood, 1 mile east of Ritter and 1.5 miles southeast of Beartown, McDowell County	0 to 5	2695	65′
Shale, gray, sandy	0 to 5	2700	
Sandstone, Upper Raleigh, heavy to current-bedded, grayish-white to brown, forms great cliffs in Fayette, Nicholas, Raleigh, Wyoming, and McDowell	50 to 75	2775	
Coal, Little Raleigh "A", not mined commercially	0 to 3	2778	
Shale, sandy, lenticular	0 to 25	2803	
Coal, Little Raleigh, multiple-bedded, soft, columnar, known as **"Snake Root"** bed of McDowell County, not mined commercially in State.	4 to 2	2805	110′
Shale, sandy, lenticular	15 to 5	2810	

	Thickness. Feet.	Total. Feet.	
Sandstone, Lower Raleigh, massive to current-bedded, lenticular, prominent cliff-maker in Fayette and Raleigh Counties	100 to 50	2860	
Coal, Beckley "Rider"	0 to 2	2862	
Shale, dark-gray, argillaceous, lenticular	0 to 17	2879	
Coal, Beckley, multiple-bedded, soft, columnar, mined commercially in Raleigh and McDowell Counties, same as "**War Creek**" bed of latter area; known as "**Slab Fork**" and "**Winding Gulf**" seams in former	0 to 10	2889	84′
Sandstone, Quinnimont, lenticular	0 to 66	2955	
Shale, Quinnimont, dark-gray, siliceous to argillaceous, laminated, lenticular	0 to 35	2990	
Coal, Fire Creek, "Quinnimont", multiple-bedded, soft, columnar, mined commercially in Fayette and Raleigh; same as locally known as "**Lower Beckley**" at Slab Fork, latter county	0 to 5	2995	106′
Shale, sandy, with sandstone layers	10 to 28	3023	
Coal, Little Fire Creek, multiple-bedded, soft, columnar, not mined commercially in State	0 to 2	3025	30′
Sandstone, Pineville, massive to current-bedded, forming sheer cliff almost 100 feet on Guyandot River at Pineville, Wyoming County	50 to 65	3090	
Shale, sandy	0 to 5	3095	
Coal, No. 9 Pocahontas, multiple-bedded, soft, columnar, not mined commercially in State	0 to 5	3100	75′
Shale and sandstone mixed	0 to 28	3128	
Coal, No. 8 Pocahontas, impure, soft, columnar, not mined commercially in State	0 to 2	3130	30′
Pocahontas Group (720 feet)			
Sandstone, Flattop Mountain, massive to current-bedded, medium-grained, micaceous, bluish-gray to brown, capping ridge summit of Flattop Mountain at Coaldale, Mercer County	20 to 50	3180	
Shale, Rift, dark-gray, with argillaceous and siliceous layers, cropping in bed of Big Creek at Rift, McDowell County	30 to 17	3197	
Coal, No. 7 Pocahontas, multiple-bedded, soft, columnar, not mined commercially in State	0 to 3	3200	70′
Shale, gray and sandy	0 to 5	3205	

	Thickness. Feet.	Total. Feet.	
Sandstone, Pierpont, heavy to current-bedded, medium-grained, hard, micaceous, bluish-gray to light-gray, making great cliff flush with Virginian Ry. grade ¼ mile southeast of Pierpont, Wyoming County....	40 to 60	3265	
Shale, sandy, alternating with sandstone.........................	0 to 35	3300	
Shale, Royal, buff, sandy, with **fresh- or brackish-water fossil fauna** in Raleigh, Fayette, and Mercer Counties........................	0 to 5	3305	
Coal, No. 6 Pocahontas, multiple-bedded, soft, columnar, mined commercially in Mercer County and just below Rainelle, Fayette.....	0 to 5	3310	110′
Shale, sandy........................	0 to 5	3315	
Sandstone, Eckman, massive to current-bedded, medium-grained, buff to bluish-gray, once quarried in hill due east of Eckman, McDowell County; often cuts out the No. 5 and No. 4 Pocahontas Coals......	40 to 67	3382	
Coal, No. 5 Pocahontas, multiple-bedded, soft, columnar, not mined commercially in State...........	0 to 5	3387	77′
Shale, sandstone, and dark shale, with plant fossils abundant...........	0 to 20	3407	
Coal, No. 4 Pocahontas, multiple-bedded, soft, columnar, mined commercially on Elkhorn Creek and Tug Fork, McDowell County.....	0 to 8	3415	28′
Shale, sandy........................	0 to 5	3420	
Sandstone, Upper Pocahontas, massive to heavy-bedded, medium-grained to coarse, quarried at Pocahontas, Virginia.........................	25 to 55	3475	
Coal, No. 3 Pocahontas "Rider", not mined in State..................	2 to 0	3475	
Shale, dark, with plant fossils abundant, and **fresh- or brackish-water fossil fauna** reported on Piney Creek, Raleigh County...........	0 to 10	3485	
Coal, No. 3 Pocahontas, multiple-bedded, soft, columnar, mined extensively in McDowell, Mercer, and Wyoming Counties...............	0 to 15	3500	85′
Shale, gray and sandy...............	0 to 10	3510	
Sandstone, Lower Pocahontas, generally massive, medium-grained, when shaly often carries 18" to 24" of **slaty coal (No. 2 Pocahontas "A")** near middle............	0 to 50	3560	
Shale, gray and sandy...............	0 to 8	3568	

	Thickness. Feet.	Total. Feet.	
Coal, No. 2 Pocahontas, multiple-bedded, soft, columnar, not mined commercially in State............	0 to 2	3570	70′
Shale, gray..........................	0 to 5	3575	
Sandstone, Vivian, massive, bluish-gray, medium-grained, lenticular, quarried at East Vivian, McDowell County..........................	0 to 29	3604	
Coal, No. 1 Pocahontas, generally single-bedded, soft, columnar, not mined in State..................	0 to 1	3605	35′
Sandstone, Landgraff, massive, buff, medium-grained, micaceous, quarried at Landgraff, McDowell County..........................	0 to 20	3625	
Coal, Landgraff, soft, columnar, not mined in State....................	0 to 1	3626	21′
Sandstone, Keystone, massive, buff, medium-grained, micaceous, making cliff 8 to 10 feet above N. & W. Ry. grade at Keystone Station, McDowell County................	0 to 23	3649	
Coal, Keystone, impure, not mined in State...........................	0 to 1	3650	24′
Shale and sandstone.................	10 to 15	3665	
Shale, North Fork, black, with thin lenses (1″ to 2″) of iron ore, carrying **fresh- or brackish-water fossil fauna,** crops flush with N. & W. Ry. grade at North Fork, McDowell County, and in same railroad grade at Matoaka................	5 to 10	3675	
Coal, Simmons, soft, columnar, cropping in public road just northwest of Simmons Station, Mercer County..........................	0 to 1	3676	26′
Shale and sandstones, alternating....	0 to 122	3798	
Coal, Squire Jim, multiple-bedded, soft, columnar, observed only near Squire Jim, McDowell County....	0 to 2	3800	124′
Shale and sandstone to **top of Mississippian,** or red shales of **Mauch Chunk**.........................	0 to 50	3850	50′

The great thickness (3850 feet) of Pottsville strata shown in the foregoing general section for southern West Virginia represents the maximum development of the series for the State in Mingo, Wyoming, and McDowell Counties, although that for the Herberton region of Fayette approaches this figure with a total of 3000 feet. These results are in marked contrast of the figures—250 to 300 feet—prevailing in the northern border of the State. The author has fortunately been able to make a study of every single member of the above section at crop exposures in some part or other of southern West Virginia, and some portions of the section may require still further revision, this being especially true in Mingo County of that portion of the Kanawha Group lying above the marine fossiliferous Dingess Limestone, since, as mentioned on a subsequent page under the description of the Winifrede Limestone, it is probable that the fossiliferous "Buffalo Creek" Limestone may correlate with this Winifrede Limestone of the Kanawha Valley. The rapid expansion of the Pottsville Series southeastward and southwestward from the Kanawha River makes it a very difficult matter to correlate accurately the several contained coals as also the many sandstones and marine fossil horizons, this difficulty being further enhanced by the fact that the intermediate region between the latter river and the Kentucky and Virginia border on the waters of Tug Fork of Big Sandy is largely forested. This is specially true for that portion of the column intervening between the Beckley and No. 3 Pocahontas Coals, where deposition has been exceptionally irregular. Otherwise, it is believed that the section as it stands will require but little revision in the future as the rapidly increasing number of mining operations on the several coal beds and the test borings and public highways incident thereto greatly facilitate the opportunities to study the rock succession.

The longest exposure of the Mauch Chunk Series occurs in the extreme southern point of Fayette on the northeast hillside of New River. Here about 1200 feet of these measures outcrop above the bed of the latter stream, while there is probably an equal thickness lying below the same datum on down to the top of the Greenbrier Limestone or middle division of the Mississippian. The following is a general section of that portion of the Series exposed at crop in the County:

General Section of the Mauch Chunk Series.

	Thickness. Feet.	Total. Feet.
Red and green shales, alternating with greenish-gray to brown, micaceous sandstones	200 to 375	375
Sandstone, Princeton Conglomerate, massive, grayish-white, very pebbly, making great cliffs along Meadow Creek, and quarried 0.4 mile southward from Meadowbridge (Clute P. O.)	50 to 75	450
Shale, gray	10 to 14	464
Limestone, Terry, carrying marine **fossils**	1 to 1	465
Red and green shales, alternating with greenish-gray to brown, micaceous sandstones	500 to 735	1200
Interval below drainage to base of Series or top of **Greenbrier Limestone,** estimated	1000 to 1300	2500

SPECIAL SECTIONS IN KANAWHA COUNTY AND FALLS DISTRICT (FAYETTE).

A large number of special sections, showing the rock succession and the thickness and character of the several beds, were measured throughout the County and in the adjoining portions of Kanawha and Nicholas with aneroid and spirit-level. These have been supplemented in many instances with the logs of diamond drill test borings for coal, and churn drill borings for oil and gas. All these will now be given by magisterial districts.

In December, 1913, while gathering data along the Kanawha River Valley to determine here the true position in the measures of the Dingess Limestone of Mingo County, described on a subsequent page, as also that of the Winifrede Coal bed, C. E. Krebs and the author measured the following important section. The upper 365 feet was determined with hand-level southwestward from the ridge summit, 0.6 mile southeast of the mouth of Scott Branch of Fields Creek, and the balance, on the south hillside of Kanawha River, immediately southwest from the C. & O. Railroad station at Winifrede Junction, that portion between the Winifrede Coal and the Dingess Limestone being measured with an aneroid, and the residue with hand-level:

Winifrede Junction Section, Kanawha County.

	Thickness. Feet.	Total Feet.	
Allegheny Series (146′)			
Sandstone, Upper East Lynn, massive, coarse-grained, grayish-white, conglomeratic, large quartz pebbles (1/8″ to 1″ in diameter), making cliff......	52	52	
Concealed in bench (holding **Middle Kittanning-"North Coalburg" Coal**)......	16	68	68′
Sandstone, East Lynn, current-bedded, medium-grained, grayish-white...........	72	140	
Concealed in bench (holds **No. 5 Block-Lower Kittanning Coal**)..............	10	150	82′
Kanawha Group, Pottsville Series (629′)			
Sandstone, Homewood, platy, current-bedded, medium-grained..............	32	182	
Concealed	29	211	
Kanawha Black Flint, typical (1212′ L.), visible..............................	4	215	65′
Concealed in bench (holding **Stockton Coal**)................................	25	240	
Sandstone, Upper Coalburg..............	10	250	
Concealed, steep slope..................	15	265	
Concealed in bench, **Coalburg Coal horizon**	5	270	55′
Sandstone, Lower Coalburg..............	50	320	
Shale and concealed.....................	45	365	
Coal, Winifrede, at closed prospect (1062′ L.)................................	..	365	95′
Sandstone, Lower Winifrede.............	20	385	
Concealed	75	460	
Concealed in bench (**Chilton Coal horizon**)	10	470	105′
Concealed in steep slope.................	40	510	
Sandstone, flaggy and shale..............	10	520	
Coal streak, Hernshaw..................	0.1	520.1	
Shale and concealed................	34.9	555	85′
Shale, dark-gray, Dingess Limestone horizon, marine fossils, genus **Productus** abundant..........	1	556	
Shale, sandy......	5	561	
Sandstone, broken, shale layers, **Upper Cedar Grove**........................	20	581	
Concealed in slight bench................	5	586	
Sandstone and concealed, (**Cedar Grove Coal horizon** at base)................	39	625	70′
Fire clay shale and shale, buff...........	8	633	
Sandstone, limy at top, flaggy and micaceous at base..	13	646	
Concealed in bench	18	664	
Concealed in steeper slope.	26	690	

	Thickness. Feet.	Total. Feet.	
Sandstone, massive, medium-grained, once quarried here, **Peerless**	31	721	
Concealed	7.8	728.8	
Coal, Peerless (662′ L.)	2.2	731	106′
Shale, gray	1.6	732.6	
Concealed	31.4	764	
Coal, No. 2 Gas, opening closed (625′ L.)	4	768	37′
Concealed to C. & O. R. R. grade at Winifrede Junction	7	775	7′

The Winifrede Coal in the above section is correctly identified, as it was carefully traced from its type locality at Winifrede, 2½ miles southwestward, to the opening in question. The Dingess Limestone horizon, represented by dark shale with characteristic marine fossil fauna, is found to belong 55 to 65 feet above the Cedar Grove Coal and 212 feet above the base of the No. 2 Gas bed.

Nine miles west of the western border of Falls District the following section was measured with hand-level by C. E. Krebs, D. B. Reger, and D. D. Teets, Jr., during 1913 on the north hillside of Kanawha River at Shrewsbury, ¼ mile west of Watson Branch and opposite the town of Coalburg. This same section was visited by the author during 1916, and the measurements and correlations verified. It is a very important section, especially as regards details of the Allegheny Series, in that this is the type locality of the **"North Coalburg Coal"** which is shown to correlate with the Middle Kittanning bed, typical of the latter in southern Clay County. The North Coalburg Coal undoubtedly belongs 70 to 90 feet above the true No. 5 Block bed of the Montgomery region, Fayette County, and at the base of the usually pebbly member of the East Lynn Sandstone series. The 3′ 10″ of coal, 65 feet above the Kanawha Black Flint and 90 feet below the "North Coalburg" Coal, as shown in the section measured for the same locality by I. C. White and published on page 300 of Volume II of the State Survey Reports, undoubtedly represents the **No. 5 Block Coal,** as corroborated both by its bed section and interval above the Kanawha Black Flint:

Shrewsbury (North Coalburg) Section, Kanawha County.

Made with hand-level by Krebs, Reger, and Teets, at North Coalburg Coal incline, ¼ mile west of Watson Branch (Fall of 1913).

				Thickness. Feet.	Total. Feet.	
Allegheny Series (190′)						
Sandstone, **Upper East Lynn**, massive, pebbly, from top of hill				70	70	
Coal, block	0′	6″	(19′ 7″) **Middle Kittanning, North Coalburg** (1333′ L.) Sunday Creek Coal Co. Mine No. 92 on Kanawha Map. See p. 448, Kanawha County Report.	20	90	90′
Slate, gray	2	9				
Coal	0	3				
Slate, black	0	4				
Coal, hard	1	5				
Slate, dark	0	7				
Coal, hard, block	3	9				
Coal, gas	0	6				
Slate, dark	1	8				
Sandstone	0	8				
Slate, dark	0	2				
Sandstone	0	6				
Slate, gray	1	4				
Slate, dark	1	2				
Coal, visible, 0′ 6″, reported	4	0				
Sandstone, massive, **East Lynn**				65	155	
Concealed (this holds **No. 5 Block Coal**)				35	190	100′
Kanawha Series (613′)						
Sandstone, massive, making cliff, **Homewood**				56	246	
Kanawha Black Flint, supplied from outcrop ¼ mile west				2	248	58′
Concealed				36	284	
Coal, (1′ 0″), **Stockton**, (1138′ L.), lower bench				1	285	37′
Shale, gray				1	286	
Sandstone, massive, **Upper Coalburg**				21	307	
Shale, gray	0′	4″	(10′ 1″) **Coalburg** (1106′ L.)	10	317	32′
Coal, impure	0	6				
Shale, gray, sandy, 0′ 6″ to	4	0				
Coal, impure	0	3				
Shale, gray, iron ore nodules	0	11				
Coal, impure	0	11				
Slate, dark	0	1				
Coal, impure	0	10				
Slate, with **coal** streaks	0	3				
Coal, gas	2	0				
Sandstone, massive, **Upper Winifrede**				41	358	
Coal, hard, splint	1′	2″	(3′ 0″) **Winifrede** (1062′ L.)	3	361	46′
Slate, dark, 0′ 0½″ to	0	1				
Coal, harder, splint	1	3				
Concealed by water	0	6				

	Thickness. Feet.	Total. Feet.	
Sandstone, massive, **Lower Winifrede**	76	437	
Concealed (should hold **Chilton Coal**)	10½	447½	
Sandstone	50	497½	
Fire clay	0½	498	
Concealed	22	520	
Shale, gray	2	522	
Coal 0′ 6″ Shale, gray 1 2 **Coal**, impure 0 3 Shale, gray 1 0 **Coal**, impure 0 5 Shale, gray 0 2 **Coal** 0 7 (4′ 1″) **Hernshaw** (897′ L.)	4	526	165′
Concealed	3	529	
Sandstone, massive	37	566	
Concealed, contains marine fossils ¼ mile west, **Dingess Limestone horizon**	20½	586½	
Coal 0′ 6″ Shale, gray 0 1 Concealed 0 10 (1′ 5″) **Williamson Coal** (835′ L.)	1½	588	62′
Sandstone, massive, **Upper Cedar Grove**	35	623	
Concealed	55½	678½	
Shale, greenish-gray, marine fossils, **Seth Limestone horizon**	4	682½	
Coal 0′ 1″ Shale, gray 1 6 **Coal**, about 3 0 (4′ 7″) **Cedar Grove** (735′ L.)	4½	687	99′
Concealed to bottom	116	803	116′

Two miles northeastward in Kanawha County the following section was measured by Teets and the author down the same hillside of the Kanawha River, just below the town of Cedar Grove and above the mouth of Mile Branch. That below the marine fossiliferous Dingess Limestone was determined with hand-level, while that above the same datum was measured with aneroid via the commercial mine of the Hacketts Coal Company in the "North Coalburg" or Middle Kittanning Coal bed. As in the section last given the great East Lynn Sandstone is shown between the latter coal and the No. 5 Block bed, at its proper interval above the Kanawha Black Flint. It also shows that the **Alma Coal** of Logan and Mingo Counties belongs in the Kanawha Valley 10 to 15 feet above the Campbell Creek Limestone in the interval separating the latter from the overlying Peerless Sandstone:

Cedar Grove Section, Kanawha County.

	Thickness. Feet.	Total. Feet.	
Allegheny Series (171')			
Sandstone, grayish-white, conglomeratic, **Upper East Lynn**	70	70	
Coal, semi-splint bed .... 2' 6" Shale, sandy, hard, dark, 2½" to .... 0 4 **Coal**, splint bed, 2' 6" to .... 2 10 Shale, sandy, 5' to .... 6 0 **Coal**, 2" to ...... 0 5 Fire clay shale . 1 0 **Coal**, semi-splint bed, bright .... 3 6 **Middle Kittanning, "North Coalburg"** at mine of Hacketts Coal Company	16.7	86.7	86.7'
Sandstone, great cliff, medium-grained, grayish-white, **East Lynn**	69.3	156	
Concealed, holding **No. 5 Block Coal horizon** near top	15	171	84.3'
Kanawha Group, Pottsville Series (567.2')			
Concealed, steep slope	60	231	
Concealed in bench, **Kanawha Black Flint horizon**	10	241	70'
Concealed	119	360	
Coal, Little Coalburg, prospect closed, some coal found	1	361	
Concealed and **coal prospect, Winifrede**, some coal on dump, closed	10	371	130'
Slate and concealed	10	381	
Sandstone, **Lower Winifrede**, making cliff, medium-grained, micaceous, greenish-gray	65	446	
Concealed	10	456	
Bench, concealed, **Chilton Coal horizon**	10	466	95'
Concealed, steep slope	60	526	
Sandstone, Williamson	32	558	
Concealed, mostly shale	7	565	
Shale, **Dingess Limestone**, bluish-gray, with marine fossil shells, **Producti** abundant	1	566	100'
Concealed, **Williamson Coal horizon**	5	571	
Sandstone, **Upper Cedar Grove**	28.2	599.2	
Shale, dark, argillaceous, **marine fossils** abundant, **Seth Limestone horizon**	12	611.2	
Coal, Cedar Grove	2.8	614	48'
Shale	10	624	
Concealed	21	645	
Sandstone, massive, **Peerless**	20	665	
Shale, sandy	4	669	
Shale, dark, fossil plants	1	670	
Coal, Alma (22")	1.9	671.9	57.9'
Shale, sandy	13	684.9	

	Thickness. Feet.	Total. Feet.	
Limestone, Campbell Creek, lenticular, "turtlebacks"	2	686.9	
Shale, sandy and flaggy	15	701.9	
Shale	5	706.9	
Coal, Peerless...0' 10" Fire clay shale, siliceous......3 0 **Coal, No. 2 Gas**..2 6 **Campbell Creek** (612' L.)	6.3	713.2	41.3'
Shale and concealed to Kanawha River, pool level	25	738.2	25'

The following section was measured by the author from the summit of the high knob ½ mile northward from Cannelton southwestward mostly on the long point to the outcrop of the No. 2 Gas Coal bed just northeast of the mouth of Staten Run and thence with the exposures along the public highway to Cannelton, opposite Montgomery. The Eagle Coal lies below the Kanawha & Michigan Railway grade at the former place, but its interval below the Stockton (Cannelton) Limestone has been supplied from the log of Coal Test Boring No. 12 on Map II, located slightly over a mile southwestward on a branch of Morris Creek, the complete details of which are published on a subsequent page in Chapter XI. That portion above the No. 2 Gas Coal was determined with aneroid, while that between the latter bed and the railway at Cannelton was measured with hand-level. The section is of special interest in that the marine fossiliferous **Winifrede Limestone** is shown as belonging 300 feet below the Kanawha Black Flint and 260 feet above the base of the No. 2 Gas Coal:

Cannelton Section, Kanawha County.

	Thickness. Feet.	Total. Feet.	
Allegheny Series (215')			
Sandstone, Upper East Lynn, coarse-grained, pebbly, friable, capping knob	55	55	
Concealed, in flat bench, **Middle Kittanning Coal horizon**	20	75	75'
Sandstone, East Lynn, brown and white, current-bedded, medium-grained, making cliff	60	135	
Concealed, steep slope, mostly sandstone.	65	200	
Coal blossom, No. 5 Block, concealed, and shale	15	215	140'

	Thickness. Feet.	Total. Feet.	
Kanawha Group, Pottsville Series (765.2′)			
Sandstone, **Homewood**, current-bedded, medium-grained, making cliff...........	55	270	
Concealed, gentle slope..................	10	280	
Kanawha Black Flint, typical (1315′ B.)..	10	290	75′
Shale	5	295	
Coal, Stockton, at Opening No. 273 on Map II, reported 5′......................	5	300	
Sandstone, **Upper Coalburg,** current-bedded, coarse, gray to brown, making cliff................................	40	340	
Concealed in flat bench, **Coalburg Coal horizon**.............................	15	355	65′
Sandstone, Lower Coalburg and Upper Winifrede, current-bedded, medium-grained to coarse, gray to grayish-brown, making great cliff............	100	455	
Concealed in bench, **Winifrede Coal horizon**.................................	10	465	110′
Sandstone, current-bedded, medium-grained, micaceous, greenish..............	25	490	
Concealed in bench with fire clay shale and **coal blossom, Lower Winifrede Coal**..	10	500	35′
Sandstone, **Lower Winifrede,** current-bedded, making great cliff, greenish-gray, micaceous............................	55	555	
Concealed	10	565	
Sandstone	5	570	
Shale, buff, sandy, partly concealed.......	15	585	
Shale, black and gray, with Producti and other marine fossils, Winifrede Limestone horizon........................	7	592	92′
Concealed and shale, buff................	5	597	
Slate, black, cannelly, (12″ to 24″) Chilton Coal horizon........................	2	599	
Shale, brown............................	1	600	
Sandstone, current-bedded, medium-grained, micaceous, greenish, making cliff, **Williamson**	65	665	
Concealed	10	675	
Coal blossom, Williamson................	..	675	83′
Shale, sandy............................	15	690	
Concealed, steep slope..................	10	700	
Concealed, in bench, **Cedar Grove Coal horizon**.............................	10	710	35′
Sandstone, **Peerless,** current-bedded, medium-grained, greenish to brown, micaceous, making cliff...............	55	765	
Shale, buff, sandy......................	15	780	
Concealed, mostly shaly sandstone.......	35	815	
Shale, buff, sandy......................	5	820	
Concealed, holding **Peerless Coal**.........	26	846	
Shale, dark, argillaceous, plant fossils abundant...........................	1	847	

			Thickness. Feet.	Total. Feet.	
Coal, soft	2′ 8″				
Shale, gray, with thin coal layers	0 4	**No. 2 Gas**	4	851	141′
Coal, medium-soft	0 10				
Shale			6	857	
Sandstone, Lower Campbell Creek			5	862	
Shale, sandy			4	866	
Coal, slaty	0′ 1″				
Shale, green, slaty	5 7				
Coal, slaty	0 4	**Lower Campbell Creek**	6	872	21′
Shale, greenish, siliceous			3	875	
Sandstone, Brownstown, medium-grained, micaceous, greenish-gray			16	891	
Shale, buff, sandy			2	893	
Coal, gas	0′ 4″				
Slate, 0″ to	0 0¼				
Coal	0 11¾				
Slate, gray, 0″ to	0 1				
Coal, gas	0 4	**Powellton Coal**	3.3	896.3	24.3′
Shale, gray, siliceous, 24″ to	1 0				
Coal, splinty, 5″ to	0 7				
Sandstone, shaly			4	900.3	
Shale, bluish, sandy			3	903.3	
Sandstone			5	908.3	
Shale, buff, sandy, laminated			23	931.3	
Limestone, (Cannelton) Stockton, dark-gray, siliceous, lenticular, 12″ to			3	934.3	38′
Shale, buff, sandy, laminated, iron ore nodules, to K. & M. R. R. grade at Cannelton (632′ L.)			5	939.3	
Interval			38.1	977.4	
Coal, Eagle (Boring No. 12 on Map II)			2.8	980.2	45.9′

The following section was measured with hand-level by Teets on the point immediately northwest of the K. & M. Ry. bridge over Smithers Creek via Coal Opening No. 91 on Map II in the Little Eagle bed. In it the intervals between important members agree closely with results obtained in the section last given. Here, the roof shales of the latter coal carry a brackish-water fossil fauna as in Wyoming and McDowell Counties:

Smithers Section, Falls District.

	Thickness. Feet.	Total. Feet.	
Kanawha Group (250′)			
Sandstone, flaggy, visible, **Peerless**	15	15	
Concealed	40	55	
Coal, No. 2 Gas, at closed opening (786′ L.)	5	60	60′

	Thickness. Feet.	Total. Feet.	
Concealed	84	144	
Limestone, Stockton, "Cannelton"	3	147	87′
Concealed	21	168	
Shale, gray, ferriferous	15	183	
Coal, Eagle (659′ L.)	4	187	40′
Slate and concealed	3	190	
Sandstone, flaggy, visible, **Decota**	10	200	
Shale, slaty, **brackish-water fossil shells**	5	205	
Coal, Little Eagle (1′ 11″) (Opening 91 on Map II)	2	207	20′
Shale, sandy, gray, plant fossils	4	211	
Sandstone, flaggy, to railroad grade at Smithers	4	215	
Concealed to Kanawha River	35	250	43′

The following succession of the rock strata is obtained by combining a section measured with aneroid by Teets from the summit of the high knob, 0.4 mile southeast of Marting, southwestward to near Fourmile Fork, with the log of the Kanawha-Gauley Coal & Coke Company No. 1 well (No. 10 on Map II), completed by the Ohio Fuel Oil Company on December 16th, 1916, the latter being authority for the well record. The section is interesting in that the total thickness of the Pottsville Series is exhibited, as also the Mauch Chunk, in the region of their minimum development in the territory of this Report:

Marting—¼ Mile Southeast Section, Falls District.

	Thickness. Feet.	Total. Feet.	
Kanawha Group (1070′)			
Sandstone, massive, medium-grained....20′ Concealed in bench....15 Sandstone, massive, medium-grained....25 } **Homewood**	60	60	
Kanawha Black Flint (1625′ B.)	5	65	65′
Shale and concealed	35	100	
Sandstone, massive, medium-grained, micaceous, **Upper Coalburg**	40	140	
Concealed	15	155	
Sandstone, massive, medium-grained	25	180	
Concealed	35	215	
Concealed in bench	10	225	
Sandstone	10	235	
Concealed	15	250	
Sandstone, massive, medium-grained	15	265	
Concealed	35	300	
Sandstone, flaggy, fine-grained	40	340	

	Thickness. Feet.	Total. Feet.	
Concealed	65	405	
Concealed in bench	10	415	
Concealed and shale	35	450	
Concealed in bench	15	465	
Sandstone, flaggy	15	480	
Concealed	55	535	
Concealed in bench	15	550	
Concealed and shale	123	673	
Coal, Peerless	2	675	610′
Shale, dark	15	690	
Coal, No. 2 Gas (975′ B.)	5	695	20′
(Continued with log of Kanawha-Gauley Coal & Coke Company Well) (No. 10 on Map II.)			
Sand, Brownstown	40	735	
Slate	15	750	
Sand	17	767	
Slate	28	795	
Sand, **Eagle**	55	850	
Slate	5	855	
Coal, Eagle	4	859	164′
Slate	8	867	
Sand	18	885	
Slate	85	970	
Lime	20	990	
Slate and shells	80	1070	211′
New River and Pocahontas Groups (860′)			
Sand, **Upper Nuttall**	50	1120	
Slate	65	1185	
Lime	35	1220	
Sand	35	1255	
Lime	25	1280	
Sand	75	1355	
Slate and shells	30	1385	
Sand	50	1435	
Slate and shells	78	1513	
Sand	57	1570	
Slate	15	1585	
Sand	75	1660	
Slate and shells	100	1760	
Lime	30	1790	
Sand	70	1860	
Slate and shells	70	1930	860′
Mauch Chunk Series (574′)			
Red rock	180	2110	
Slate	30	2140	
Red rock	33	2173	
Slate and shells	162	2335	
Sand, Maxton	62	2397	
Little Lime	33	2430	
Slate cave	10	2440	
Slate and shells	64	2504	574′
Greenbrier Limestone (225′)			
Big Lime	225	2729	225′

	Thickness. Feet.	Total. Feet.	
Pocono Sandstones (450′)			
Dark sand.... 4′ } Big Injun......5 } **Big Injun**	59	2788	
Slate and shells	391	3179	450′
Catskill Sandstones (567′)			
Slate and shells, to bottom of hole	567	3746	567′
"Dry in all sands and abandoned.			
"Casing record: 10″, 210′; 8¼″, 1256′; 6⅝″, 1678′; 5 3/16″, 1819′."			

The following section was measured with aneroid by Teets down the northeast hillside of Kanawha River nearly on the strike of the strata. It gives 650 feet as the interval between the bases of the Kanawha Black Flint and the No. 2 Gas Coal:

Harewood Section—¼ Mile Northwest, Falls District.

	Thickness. Feet.	Total. Feet.	
Allegheny Series (110′)			
Sandstone, pebbly, **Upper East Lynn**	30	30	
Concealed in bench, **"North Coalburg", Middle Kittanning Coal horizon**	5	35	35′
Sandstone, massive, **East Lynn**	65	100	
Coal, No. 5 Block—Lower Kittanning, at closed digging, (1675′ B.) **(No. 2 on Map II)**	5	105	
Concealed	5	110	75′
Kanawha Group (1085′)			
Sandstone, **Homewood**	62	172	
Kanawha Black Flint	8	180	70′
Concealed, **(holding Stockton Coal)**	25	205	
Sandstone, massive, **Upper Coalburg**	60	265	
Shale and concealed	10	275	
Sandstone, massive, making cliffs	25	300	
Concealed in bench	10	310	
Sandstone, massive	30	340	
Concealed in bench	15	355	
Sandstone, massive to current-bedded, **Upper Winifrede**	70	425	245′
Concealed in bench **(Winifrede Coal horizon)**	15	440	
Sandstone and concealed	125	565	
Concealed in bench	25	590	
Concealed	165	755	
Sandstone, massive, **Peerless**	35	790	
Concealed	35	825	
Coal, No. 2 Gas (980′ B.)	5	830	405′
Concealed	120	950	
Slate, gray	15	965	
Coal, Eagle (840′ B.) **(Mine No. 71 on Map II)**	5	970	140′
Interval to bed of Kanawha River, about	225	1195	225′

The following section was measured with aneroid by Teets down the northeast hillside of Kanawha River at Boomer practically on the strike of the strata:

Section at Boomer, Falls District.

	Thickness. Feet.	Total. Feet.	
Kanawha Group (1140')			
Sandstone, massive, cliff, **Homewood**	57	57	
Kanawha Black Flint (1680' B.)	8	65	65'
Concealed	15	80	
Sandstone, massive, cliff, coarse, brownish-gray, **Upper Coalburg**	85	165	
Concealed (**Coalburg Coal horizon**)	10	175	110'
Sandstone, massive, cliff, buff, medium-grained	40	215	
Shale and concealed	40	255	
Sandstone, massive, cliff, coarse, gray and brown, micaceous	45	300	
Concealed	24	324	
Coal blossom	1	325	150'
Sandstone and concealed, in bench	35	360	
Sandstone, massive to current-bedded, medium-grained, brown	40	400	
Concealed	8	408	
Slate, gray	2	410	
Concealed	9	419	
Slate, black	1	420	
Concealed	33	453	
Limestone, impure	2	455	
Slate and sandstone	34	489	
Coal, Williamson	1	490	165'
Bench	10	500	
Sandstone, fine-grained	15	515	
Shale and concealed in bench	35	550	
Sandstone, coarse-grained, making cliff	55	605	
Concealed	10	615	
Sandstone, medium- to fine-grained	49	664	
Coal blossom, 8" to	1	665	
Concealed	35	700	
Coal, at closed digging, **No. 2 Gas** (1050' B.)	..	700	210'
Concealed	49.5	749.5	
Coal blossom, Powellton, (6")	0.5	750	50'
Sandstone, fine-grained, flaggy and concealed	37	787	
Limestone, gray and hard, **Stockton (Cannelton)** (960' B.)	3	790	40'
Unrecorded to K. & M. R. R. grade (645' L.)	315	1105	
Concealed to Kanawha River	35	1140	350'

The following is a section, copied by Teets from results obtained with hand-level by J. E. Settle and checked by R. R.

Barton, Engineer for the Boomer Coal & Coke Company, northward down what is known as Schoolhouse Hollow, tributary to Boomer Branch and ¾ mile eastward from the mouth of the latter stream. It is very probable that an error has been made in carrying forward the totals in this section, as it gives only 491.3 feet for the Kanawha Black Flint—No. 2 Gas Coal interval as against 675 feet for the same on the opposite hillside of Kanawha River from Boomer, and over 600 feet at several of the preceding sections for Falls District. The error apparently occurs in the interval separating the Winifrede and Williamson Coal beds as correlated in the section. The intervals should really be greater instead of less than the average vertical measurements obtaining in the region, since the section is measured northwestward on the dip of the strata:

Boomer—¾ Mile East Section, Falls District.

		Thickness.		Total.		
Kanawha Group (716′ 11″)		Ft.	In.	Ft.	In.	
Sandstone, Homewood		70	0	70	0	
Coal, Stockton "A"		2	0	72	0	
Kanawha Black Flint		6	0	78	0	78′ 0″
Coal ....1′ 1½″						
Slate 0 9	Stockton	3	4	81	4	
Coal 1 5½						
Sandstone, Upper Coalburg		88	0	169	4	
Concealed, with sandstone		32	9	202	1	
Coal, bony, Coalburg		1	3	203	4	125′ 4″
Sandstone, Upper Winifrede		81	0	284	4	
Concealed		25	6	309	10	
Coal, splint...1′ 4½″						
Slate 0 3	Winifrede	3	4	313	2	109′ 10″
Coal, splint...1 8½						
Concealed		17	7	330	9	
Coal, splint...0′ 11½″						
Slate 0 2½	Chilton	2	5	333	2	20′ 0″
Coal, splint...1 3¼						
Concealed		49	0	382	2	
Slate		0	11	383	1	
Coal ....2′ 0 ″						
Slate 0 8						
Coal 0 7						
Clay 0 1½	Williamson	5	6½	388	7½	55′ 5½″
Coal 0 9½						
Soapstone ..0 8½						
Coal 0 8						
Shale and sandstone		22	0	410	7½	
Shale		35	6	446	1½	
Concealed and sandstone		18	0	464	1½	

				Thickness.		Total.		
				Ft.	In.	Ft.	In.	
Concealed and hard, gray sandstone, **Peerless**				45	0	509	1½	
Shales				18	0	527	1½	
Coal, Peerless				2	0	529	1½	
Shale and sandstone				35	0	564	1½	
Coal, No. 2 Gas				5	2	569	3½	180′ 8″
Concealed				40	0	609	3½	
Coal, soft	1′	1 ″	**Powellton**	4	9	614	0½	44′ 9″
Slate, gray and hard	0	0½						
Coal, soft	0	3						
Slate, gray	0	8						
Coal, soft	0	10						
Slate	0	3						
Coal, splint	0	3						
Slate	0	2						
Coal	1	2½						
Concealed				75	0	689	0½	
Coal	3′	5″	**Eagle** (996′ L.)	14	3	703	3½	89′ 3″
Concealed	8	0						
Bone	0	2						
Coal	2	8						
Concealed				11	0	714	3½	
Coal	0′	5 ″	**Little Eagle**	2	7½	716	11	13′ 7½″
Clay	0	2½						
Coal	2	0						

The following section was measured with aneroid by Teets southward on the north hillside of Kanawha River to the K. & M. Ry. grade, ½ mile above the mouth of Jarrett Branch:

Deepwater—½ Mile North Section, Falls District.

	Thickness. Feet.	Total. Feet.	
Kanawha Group (525′)			
Concealed	60	60	
Coal, No. 2 Gas, at closed opening (**No. 28B on Map II**) (1200′ B.)	5	65	65′
Shale and concealed	82	147	
Limestone, Stockton, "Cannelton"	3	150	85′
Concealed	25	175	
Coal, Eagle, (1080′ B.)	5	180	30′
Concealed	5	185	
Sandstone	40	225	
Concealed	20	245	
Sandstone	10	255	
Concealed	30	285	
Sandstone, coarse-grained	20	305	
Shale and concealed	25	330	
Sandstone, medium-grained	100	430	

	Thickness. Feet.	Total. Feet.	
Concealed	40	470	
Sandstone, fine-grained	25	495	
Concealed	30	525	345′
New River Group (90′)			
Sandstone, medium-grained, making cliff, **Upper Nuttall** to K. & M. R. R. grade.	90	615	90′

The following section in the same District was measured with aneroid southward from an opening in the No. 2 Gas Coal on the north hillside of New River to the bed of the latter stream at the mouth of Cane Branch. That portion included in the Kanawha Group was determined by Teets, while that in the New River was measured by the author. Southeastward from this point the conglomeratic Guyandot Sandstone at the base of the section practically coalesces with the underlying Upper Raleigh Sandstone to a point about one mile below Cotton Hill where they rapidly separate, the intervening shales carrying the Sewell Coal horizon but no coal:

Gauley Bridge—1 Mile Southeast Section, Falls District.

	Thickness. Feet.	Total. Feet.	
Kanawha Group (490′)			
Coal 1′ 2″ Bone 0 2 **Coal** 0 11 Slate 0 1½ **Coal** 1 5½ } **No. 2 Gas** (1525′ B.)	3.8	3.8	
Slate and concealed	21.2	25	
Sandstone	40	65	
Concealed	20	85	
Sandstone	15	100	
Concealed	24	124	
Coal blossom, Eagle (1405′ B.)	1	125	125′
Concealed	35	160	
Sandstone	25	185	
Concealed	5	190	
Concealed in bench	5	195	
Sandstone	30	225	
Concealed	105	330	
Concealed in bench	15	345	
Concealed	20	365	
Sandstone	10	375	
Concealed	40	415	
Sandstone, flaggy	35	450	
Concealed	25	475	
Sandstone	10	485	
Concealed	5	490	365′

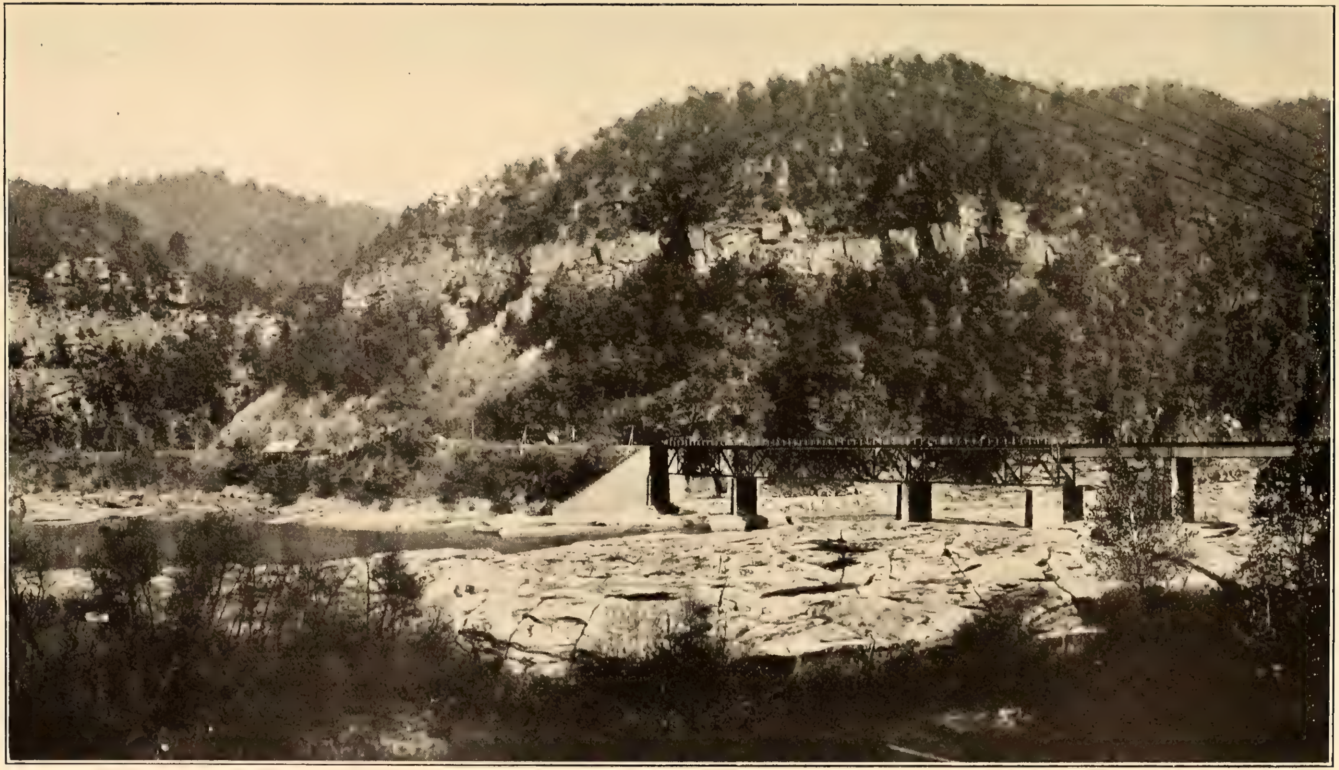

PLATE V.—View looking north across New River at Gauley Junction, showing topography of Kanawha and New River Groups, Upper and Lower Nuttall Sandstone cliffs, Guyandot Sandstone in bed of river, and C. & O. Railroad bridge.

	Thickness. Feet.	Total. Feet.	
New River Group (341')			
Sandstone, **Upper and Lower Nuttall**, making great cliff	159	649	
Coal, Hughes Ferry, Iaeger	1	650	160'
Shale and sandstone, interlaminated	4	654	
Sandstone, grayish-white, current-bedded	15	669	
Shale, sandy	5	674	
Sandstone, grayish-white, platy	20	694	
Shale, bluish-black, sandy	40	734	
Sandstone, broken, laminated with iron ore nodules and lenses	40	774	
Shale, sandy, dark, laminated	35	809	
Coal, bony, Castle, exposed on opposite side of river	0.5	809.5	159.5'
Shale, sandy	1.5	811	
Sandstone, **Guyandot**, conglomeratic, forming bed of New River at mouth of Cane Branch, visible 15' to	20	831	21.5'

The following section was measured with aneroid by Teets northwestward on the east hillside of Gauley River via Mine No. 30 on Map II in the No. 2 Gas Coal to the bed of the latter stream at Vanetta. The intervals are greater than they should be since there is a dip of about 70 feet in the strata northwest from the coal opening to the base of the section:

Vanetta Section, Falls District.

	Thickness. Feet.	Total. Feet.	
Kanawha Group (487')			
Sandstone, fine-grained, visible	7	7	
Shale, gray, plant fossils	2	9	
Coal, blocky 1' 2" **Coal, gas,** glossy 1 10 **Coal, gray,** splint 0 4 **No. 2 Gas (1320' B.) (Mine No. 30 on Map II)**	3.3	12.3	12.3'
Concealed	9.7	22	
Sandstone, fine-grained, **Brownstown**	45	67	
Concealed, in bench, **Powellton Coal horizon**	7	74	61.7'
Sandstone, fine-grained, gray to brown 3' Sandstone, massive, medium-grained, micaceous, buff 55 **Eagle**	58	132	
Concealed and sandstone	137	269	
Black slate, Eagle	3	272	198'
Concealed and shale	15	287	
Sandstone, massive, medium-grained, micaceous, gray	35	322	
Concealed in steep slope	120	442	

	Thickness. Feet.	Total. Feet.	
Concealed in bench	15	457	
Concealed, sandstone, and shale	15	472	
Concealed in large well-defined bench, top of **Nuttall Sandstone**	15	487	215′
New River Group (205′)			
Sandstone, Upper Nuttall, concealed and shale	105	592	
Sandy, shale, and sandstone, **Lower Nuttall,** to railroad grade at Vanetta	65	657	
Concealed to Gauley River	35	692	205′

One mile and a half northward on the same hillside of Gauley River, Teets measured with aneroid the following section northwestward via Mine No. 14 on Map II in the Coalburg Coal down to the bed of the last-mentioned stream at Gamoca. Owing to a dip of about 50 feet to the northwest between the top and base of the section, the intervals are greater than they should be. Mr. Teets fails to record the Upper Nuttall Sandstone, but its top should belong 15 to 25 feet above the base of the section here, based on its interval below the Eagle Shale in the preceding section:

Gamoca Section, Falls District.

			Thickness. Feet.	Total. Feet.	
Kanawha Group (1170′)					
Concealed			50	50	
Sandstone, massive, medium-grained, **Homewood**			35	85	
Concealed			10	95	
Kanawha Black Flint (1825′ B.)			5	100	100′
Concealed and shale, sandy			48	148	
Coal	2′	0″			
Slate, gray	4	0			
Coal, splint	1	9	**(11′ 10″) Coalburg**		
Slate	0	1	**(Mine No. 14 on**		
Coal, soft top	1	6	**Map II)** 12	160	60′
Bone	0	5			
Coal, splint	2	1			
Slate and concealed			40	200	
Sandstone, medium-grained, **Upper Winifrede**			50	250	
Concealed			180	430	
Sandstone			70	500	
Concealed			50	550	
Sandstone			50	600	
Concealed			60	660	
Slate			9	669	

	Thickness. Feet.	Total. Feet.	
Coal blossom	1	670	
Slate and concealed	30	700	
Coal, No. 2 Gas, thickness not recorded	..	700	540′
Slate	10	710	
Sandstone, massive	30	740	
Concealed	4	744	
Shale	5	749	
Coal, Powellton (1170′ B.)	1	750	50′
Concealed	48	798	
Limestone, Stockton, impure	2	800	50′
Concealed	34	834	
Coal, Eagle	1	835	35′
Concealed, with shale and sandstone	87	922	
Black slate, Eagle, marine fossils abundant	3	925	90′
Sandstone and concealed	173	1098	
Coal, Gilbert	2	1100	175′
Concealed to C. & O. R. R. grade at Gamoca	35	1135	
Concealed to Gauley River	35	1170	70′

The following section was measured with aneroid by Teets northwestward down the east hillside of Gauley via Coal Mines Nos. 12 and 33 in the Coalburg and No. 2 Gas beds, respectively, to the bed of the River just below Wyndal. As in the section last given the intervals between important members are greater than they should be, owing to a dip in the strata of about 60 feet to the northwest between the exposures of the top and basal members of the section. This, as also the preceding sections for Vanetta and Gamoca, establishes the fact that the bed long mined commercially on Gauley River and its tributaries from Gauley Bridge to Carterboro and Greendale in Nicholas County, at 60 to 90 feet below the Kanawha Black Flint, correlates with the Coalburg Coal and not the Stockton, since the latter is found in good thickness directly at the base of the Flint ledge:

Wyndal—0.5 Mile Southeast Section, Falls District.

	Thickness. Feet.	Total. Feet.	
Kanawha Group (1075′)			
Concealed, from top point above drum head	35	35	
Sandstone, massive, medium-grained, **Homewood**	35	70	
Concealed	15	85	
Kanawha Black Flint (1710′ B.)	20	105	105′
Concealed	20	125	

	Thickness. Feet.	Total. Feet.	
Sandstone, massive, making cliff, **Upper Coalburg**	35	160	
Concealed	10	170	
Coal, Coalburg, (1625′ B.) (same bed as mined at No. 13 on Map II)	5	175	70′
Concealed	125	300	
Concealed in bench	10	310	
Concealed	29	339	
Coal blossom, Winifrede?	1	340	165′
Concealed	59	399	
Coal blossom, Chilton	1	400	60′
Shale, slaty	10	410	
Sandstone, massive	30	440	
Concealed	20	460	
Sandstone	40	500	
Concealed	35	535	
Concealed in marked bench	15	550	
Concealed	15	565	
Sandstone	20	585	
Concealed	15	600	
Sandstone, massive, soft, micaceous	15	615	
Concealed	9	624	
Coal blossom, Peerless, (1160′ B.)	1	625	225′
Shale and sandstone massive	36	661	
Coal, hard .2′ 3″ Slate .....0 3 **Coal** ......0 5 Slate .....0 1 **Coal** ......0 4 Slate .....0 1 **Coal** ......0 6 (3′ 11″) **No. 2 Gas (Mine 33 on Map II)** (1110′ B.)	4	665	40′
Concealed	10	675	
Sandstone, massive, **Brownstown**	22	697	
Coal, gas .1′ 1″ Slate ...0 1 **Coal** ....1 0 Slate ...0 3 **Coal** ....0 11 (3′ 4″) **Powellton** (1075′ B.)	3	700	35′
Sandstone, massive, medium-grained	50	750	
Sandy shale and sandstone	35	785	
Sandstone	25	810	
Shale, sandy	40	850	
Concealed	14	864	
Coal blossom (6″)	1	865	165′
Shale, sandy	5	870	
Sandstone	20	890	
Shale, sandy	10	900	
Sandstone	10	910	
Concealed	90	1000	
Shale, ferriferous	10	1010	
Concealed	10	1020	
Sandstone and concealed to railroad grade at Wyndal	55	1075	

About one mile northwestward the following succession is obtained by combining a section measured with aneroid by Teets northeastward from the summit of the high knob, ¾ mile due west of Wyndal, down the long point, with the log of the Newman No. 1 Well—No. 9 on Map II, completed October 25, 1913, by the C. O. G. Company, the well record being on the authority of Mr. C. E. Krebs of Charleston, W. Va. The section starts at top with the highest member of the Kanawha Group and includes the entire Pottsville Series. In that portion measured above the well mouth, the intervals are slightly greater than they should be, as there is a dip in the strata of 20 to 25 feet between the summit of the knob and the well in question:

Belva—0.7 Mile South Section, Falls District.

	Thickness. Feet.	Total Feet.	
Kanawha Group (1216′)			
Sandstone, massive, coarse, gray, with brown specks, **Homewood**	75	75	75′
Concealed, probably holds **Kanawha Black Flint**	25	100	
Sandstone, **Upper Coalburg**, massive, making cliff, medium-grained, micaceous, gray and brown	60	160	85′
Concealed	50	210	
Sandstone, massive, cliff, medium-grained, **Upper Winifrede**	25	235	
Concealed in bench, **Winifrede Coal horizon**	15	250	90′
Sandstone, Lower Winifrede	25	275	
Concealed	40	315	
Sandstone	10	325	
Concealed	10	335	
Sandstone	25	360	
Concealed	50	410	
Sandstone	10	420	
Concealed	5	425	
Sandstone, Williamson	35	460	
Concealed in bench	30	490	
Sandstone, Upper Cedar Grove	55	545	
Concealed	25	570	
Sandstone, fine-grained, **Peerless**	65	635	
Concealed in bench	25	660	
Concealed	10	670	
Sandstone	10	680	
Concealed, probably holds **No. 2 Gas Coal**	20	700	450′
Shale and sandstone	20	720	
Concealed in bench	20	740	
Shale and concealed	45	785	

	Thickness. Feet.	Total. Feet.	
Sandstone, massive	30	815	
Concealed in bench, **Eagle Coal horizon**	20	835	135′
Concealed	48	883	
Coal and slate, Little Eagle	2	885	50′
Concealed	30	915	
Sandstone to top of Newman No. 1 Well (No. 9 on Map II) (745.6′ L.)	20	935	50′
(Continued with Log of Newman No. 1 Well—No. 9 on Map II):			
Gravel	34	969	
Slate, blue	25	994	
Slate, dark	30	1024	
Sand, light	5	1029	
Slate, dark	15	1044	
Slate and shale	25	1069	
Sand, light, hard	15	1084	
Slate, dark, hard	10	1094	
Sand, dark, hard	10	1104	
Slate, dark, soft	12	1116	
Lime shale, light, hard	5	1121	
Slate, white, soft	25	1146	
Lime, white, hard	20	1166	
Slate, dark, soft	10	1176	
Lime, white, hard	15	1191	
Slate, white, hard	10	1201	
Lime, white, hard	15	1216	281′
New River and Pocahontas Groups (850′)			
Sand, white, hard, **Upper Nuttall**	18	1234	
Slate, white, soft	10	1244	
Lime, white, hard	15	1259	
Slate, white, soft	5	1264	
Lime, white, hard	16	1280	
Conglomerate, hard, **Lower Nuttall**	77	1357	141′
Slate, dark	20	1377	
Sand, dark, hard	15	1392	
Slate, light, soft	5	1397	
Sand, light, hard	7	1404	
Slate and shales	63	1467	110′
Conglomerate ...12′ } **Sand, white**......57 } **Guyandot**	69	1536	
Lime, dark	12	1548	
Sand, dark	37	1585	
Lime, pink	15	1600	133′
Sand, white, Upper and Lower Raleigh and Quinnimont, (water at 892′ and 902′)	256	1856	
Slate, dark	108	1964	
Lime, dark	20	1984	
Sand, brown	72	2056	
Slate, dark	10	2066	466′
Mauch Chunk Series (359′)			
Red rock	16	2082	
Lime, dark	10	2092	
Slate, dark	20	2112	
Lime, dark	20	2132	

	Thickness. Feet.	Total. Feet.	
Slate, dark	23	2155	
Red rock	66	2221	
Slate, dark	20	2241	
Dirty red rock	30	2271	205′
Sand, gray, Maxton, (Princeton Conglomerate)	37	2308	
Slate, dark	35	2343	
Slate and sand shale	10	2353	
Slate, dark	18	2371	
Lime, gray	14	2385	
Slate, dark	40	2425	154′
Greenbrier Limestone (161′)			
Big Lime	161	2586	161′
Pocono Sandstone Series (189′)			
Sand, Keener, (gas)	3	2589	
Sand ....52′ } **Big Injun** Sand, light gas in bottom...44 }	96	2685	
Slate	1	2686	
Red sand	15	2701	
Lime, gritty	14	2715	
Slate	52	2767	
Lime, shale	4	2771	
Slate to bottom of hole	4	2775	189′

Casing record: 10″, 35′; 8¾″, 885′; 6⅝″ 1076′; and 5$\frac{3}{16}$″, 1552′.

One mile and a half northeastward the following section was measured with aneroid by Teets southeastward down the north hillside of Twentymile Creek to the top of the O. F. Havener No. 1 Well—No. 6 on Map II, one mile northeast of Belva. The intervals are slightly less than they should be, owing to a rise of 25 to 30 feet in the strata in the direction the determinations were made:

Belva—1 Mile Northeast Section, Nicholas County.

	Thickness. Feet.	Total. Feet.	
Allegheny Series (80′)			
Sandstone, massive, coarse, gray, **East Lynn**	30	30	
Concealed and shale	10	40	
Sandstone, medium-grained	30	70	
Concealed (**horizon of No. 5 Block Coal**)	10	80	80′
Kanawha Group (865′)			
Concealed	10	90	
Sandstone	25	115	
Concealed	10	125	
Sandstone and shale	20	145	
Kanawha Black Flint (1500′ B.)	5	150	70′
Concealed	15	165	
Sandstone	15	180	

	Thickness. Feet.	Total. Feet.
Concealed	120	300
Sandstone	30	330
Concealed	20	350
Sandstone	25	375
Concealed	10	385
Sandstone	20	405
Concealed	55	460
Sandstone	10	470
Concealed	39	509
Coal, Hernshaw ?	1	510
Concealed	357	867
Coal, Eagle (No. 368 on Map II)	3	870
Concealed to top O. F. Havener Well (No. 6 on Map II) (705′ B.)	75	945

The following section was measured by Teets southeastward from the summit of the high point ¼ mile northwest of the mouth of House Branch of Bells Creek to the bed of the former stream. The intervals are less than they should be, owing to the rapid northwest dip of the strata prevailing here. The section is important, in that the true position on Gauley River waters is shown for the Kanawha Black Flint to the Upper Kittanning, Middle Kittanning (North Coalburg) Stockton, and Coalburg Coal beds:

House Branch of Bells Creek Section, Falls District.

	Thickness. Feet.	Total. Feet.	
Allegheny Series (170′)			
Concealed from summit of point	20	20	
Coal blossom, Upper Kittanning ("Queen Shoals") (1465′ B.)	1	21	21′
Concealed and shale	50	71	
Sandstone, **Upper East Lynn**, massive, coarse-grained	24.1	95.1	
Coal, gray splint ....2′ 3″ Bone .... 0 6 **Coal**, splint ....0 9 Slate ....0 2 **Coal**, splint ....1 2 **Middle Kittanning ("North Coalburg")** (No. 266 on Map II) (1395′ B.)	4.9	100	79′
Concealed	70	170	
Kanawha Group, Pottsville Series (505′)			
Concealed	60	230	
Kanawha Black Flint	5	235	
Shale	5	240	
Coal, Stockton (1255′ B.)	5	245	145′
Concealed	71.9	316.9	

	Thickness. Feet.	Total. Feet.	
Coal ....1′ 0″ Slate ......0 1 **Coal** ....1 2 Slate ......0 1 **Coal** ....0 9 **Coalburg** (1180′ B.)...	3.1	320	75′
Concealed	95	415	
Sandstone, massive, medium-grained, **Lower Winifrede**....................	50	465	
Concealed	10	475	
Sandstone	25	500	
Concealed	25	525	
Concealed in bench....................	15	540	
Concealed	24	564	
Coal blossom, Hernshaw (945′ B.)........	1	565	245′
Concealed to bed of House Branch.......	110	675	110′

The following section was measured with aneroid by the author northwest down the south hillside of Gauley River via Coal Opening No. 100 on Map II in the Sewell bed:

Mouth of Horseshoe Creek, Gauley River Section, Falls District.

	Thickness. Feet.	Total. Feet.	
New River Group (605′)			
Sandstone, Upper Nuttall, making great cliff..................................	100	100	
Concealed	10	110	
Sandstone, Lower Nuttall, great cliff, very pebbly..............................	85	195	195′
Concealed	217	412	
Sandstone, Guyandot....................	15	427	
Coal, slaty...0′ 4″ **Coal, soft**....2 9 **Sewell**, (**No. 100 on Map II**) (905′ B.)...	3	430	235′
Slate, concealed, and shale...............	25	455	
Sandstone, Upper Raleigh, making great cliff, current-bedded, grayish-white...	65	520	
Concealed to Gauley River 0.2 mile above mouth of Horseshoe Creek...........	85	605	175′

The results in the above section are slightly greater than they should be, owing to the northwest dip of the strata.

The following section was measured with aneroid by the author from the summit of the high knob, 1.2 miles south of the mouth of Peters Creek, northward and then northwestward down Flat Rock Hollow to the bed of Gauley River, 1.1 miles due west of the mouth of Laurel Creek. The opening in the Sewell Coal, reported by Squire Halstead and referred to at the top of page 224 of Volume II(A) of the State Survey Reports by I. C. White, was closed, but its section was supplied from the reference in question. The results are greater than they should be, owing to a dip of 50 to 60 feet in the strata between the summit of the knob in question and the mouth of Flat Rock Hollow:

Mouth of Peters Creek—0.7 Mile South Section, Falls District.

	Thickness.	Total.	
Kanawha Group (455′)	Feet.	Feet.	
Shale and concealed from summit of knob	21	21	
Coal blossom, heavy, Eagle	4	25	25′
Concealed and shale	56	81	
Coal 0′ 1″			
Shale, dark 1 5 } **Little Eagle**	4	85	60′
Coal, soft 2 6			
Shale and concealed	65	150	
Shale, Eagle, black, marine fossils	15	165	80′
Sandstone, **Lower War Eagle**, coarse, brown, friable	50	215	
Concealed in bench	10	225	
Concealed in gentle slope	65	290	
Sandstone, Lower Gilbert	30	320	
Concealed in bench, **Gilbert Coal horizon**	10	330	165′
Sandstone, **Dotson**, coarse, brown, friable	65	395	
Concealed	60	455	125′
New River Group (485′)			
Sandstone, Upper Nuttall, medium-coarse, grayish-white, making great cliff	120	575	
Concealed	25	600	
Sandstone, **Lower Nuttall**, massive, conglomeratic, grayish-white, great cliff	85	685	230′
Concealed and sandstone	171.5	856.5	
Coal, soft 1′ 2″ } **Sewell** (digging closed)			
Coal, hard 0 2 } (No. 457 on Map II) (See			
Coal, soft 2 2 } p. 225 of Vol. II(A)	3.5	860	175′
Concealed, mostly shale	25	885	
Sandstone, Upper Raleigh, massive, grayish-white, conglomeratic, to bed of Gauley River, mouth of Flat Rock Hollow	55	940	80′

Two miles eastward the following section was measured with aneroid by the author from the summit of a high knob, 1.3 miles N. 10° E. of Albion, southeastward to the top of the Upper Nuttall Sandstone in the public highway, 0.8 mile northeast of Albion. That portion included in the New River

Group was determined along the hill road leading southward from Albion to Woods Ferry at the mouth of Ramsey Branch. In both groups the intervals are less than they should be, owing to the southward and southeastward rise of the strata:

Albion—Woods Ferry Section, Nicholas County.

Kanawha Group (690′)	Thickness. Feet.	Total. Feet.	
Unrecorded from top of knob 1.3 miles N. 15° E. of Albion	200	200	
Coal, Cedar Grove, (No. 280 on Map II), at closed prospect, splinty	..	200	200′
Concealed	24	224	
Shale, buff, sandy	8	232	
Coal, Peerless, at closed prospect, reported by O. W. Mason, 36″ thick, clean and bright	3	235	35′
Concealed in steep slope	43.6	278.6	
Sandstone	2	280.6	
Coal, gas, medium-soft 0′ 9″ Shale, gray 1 3 **Coal** 0 1 Shale, gray 0 5 **Coal**, gas, medium-soft 0 6 Bone, sulphurous 0 2 **Coal**, gas, medium-soft 1 3 4′ 5″ **No. 2 Gas** (1760′ B.)	4.4	285	50′
Shale, gray	3	288	
Concealed	22	310	
Shale, buff, sandy	8.2	318.2	
Coal, Powellton, at closed opening, reported by O. W. Mason 22″ thick	1.8	320	35′
Concealed	30	350	
Shale, buff, sandy	6	356	
Coal 1′ 0″ Slate 0 2 **Coal** 1 10 Slate 0 2 **Coal**, 8″ to 0 10 **Eagle**, at closed prospect (section by O. W. Mason)	4	360	40′
Sandstone and concealed	58	418	
Shale, buff and dark	5	423	
Coal, Little Eagle, 23″ to	2	425	65′
Shale, buff, sandy and flaggy	45	470	
Slate, black, Eagle, partly concealed, marine fossils	25	495	70′
Sandstone, coarse, friable, brown, **Lower War Eagle**	40	535	
Concealed and fire clay in bench	5	540	
Sandstone, coarse, brown, friable, **Upper and Lower Gilbert**	60	600	

	Thickness. Feet.	Total. Feet.	
Concealed	20	620	
Shale, buff, sandy	8.5	628.5	
Coal, soft..1' 11½" Slate, gray.0 1½ **Coal, soft..0 6** } **Gilbert (Opening No. 431 on Map II)** (1410' B.)	1.5	630	135'
Concealed, along gentle slope, to top Upper Nuttall Sandstone on point 0.1 mile southwest of U. S. B. M. 1305	60	690	60'
New River Group (375')			
Sandstone, **Upper Nuttall**, grayish-white, makes great cliff	80	770	
Concealed	15	785	
Sandstone, **Lower Nuttall**, grayish-white and pebbly, makes great cliff	65	850	160'
Concealed and sandstone, flaggy	35	885	
Concealed and shale	10	895	
Sandstone, making great cliff, **Harvey Conglomerate**	55	950	
Concealed	19.5	969.5	
Coal blossom, Castle (1080' B.)	0.5	970	120'
Sandstone and concealed to Gauley River at Woods Ferry	95	1065	95'

Slightly less than two miles northeastward the following section was measured with aneroid by D. B. Reger of the W. Va. Geological Survey Staff during the field season of 1917 while engaged in gathering data for a detailed report for the State on Nicholas County. That portion included in the Kanawha Group was determined from the summit of Panther Knob southward and eastward to the road summit at the low gap with elevation of 1594' L. on map, and thence southward along the hill road to the top of the Upper Nuttall Sandstone; while that included in the New River Group was measured from the top of the Upper Nuttall Sandstone, 0.6 mile southeast of Backus Schoolhouse, southwestward down the steep hillside of Gauley River to the bed of the latter, 0.6 mile below the mouth of Meadow Creek. The intervals above the top of the latter group are slightly less than they should be owing to the rise in the strata in the direction the results were determined, but on the whole the section agrees fairly well with that last given:

Panther Mountain Section, Jefferson District, Nicholas County.

Kanawha Group (980')	Thickness. Feet.	Total. Feet.	
Sandstone, cliff rock, Upper Coalburg, capping Panther Mountain	30	30	
Concealed in bench, Coalburg Coal horizon?	10	40	40'
Sandstone, cliff, Upper Winifrede	80	120	
Concealed	50	170	
Bench, Chilton "A" Coal horizon?	..	170	
Sandstone, massive, partly concealed, Upper and Lower Chilton	85	255	
Shale, sandy and concealed	25	280	
Coal opening, abandoned, Hernshaw (2090' B.), thickness unknown	..	280	240'
Concealed and sandy shale	35	315	
Slate, black, streak	..	315	
Sandstone, massive	30	345	
Concealed and sandy shale	40	385	
Sandstone	10	395	
Shale, sandy	68	463	
Limestone, hard, gray, Seth? (1905' B.)	2	465	185'
Shale, sandy	15	480	
Sandstone, Peerless	45	525	
Concealed	10	535	
Slate, black	..	535	
Concealed	21	556	
Coal ...3' 3" Slate ...0 1 Coal ...0 6 (3' 10") (Peerless) Coal (1810' B.) (Frank Johnson Mine, reported section)	4	560	95'
Concealed	8	568	
Sandstone, massive	30	598	
Slate	1	599	
Coal ....0' 6" Shale, gray.0 10 Coal ....0 1 Shale, dark.0 6 Coal, soft..0 9½ Slate, black.0 0½ Coal, soft..1 4 Slate ......1 0 Coal ....0 8 (5' 9") No. 2 Gas Coal (1765' B.) (Frank Johnson Mine)	6	605	45'
Concealed in bench	15	620	
Concealed in bluff, with sandstone, Eagle.	49	669	
Shale, sandy, dark	10	679	
Coal, soft..1' 8" Slate, dark.0 5 Coal, soft..0 11 Slate, dark.0 1 Coal, soft..0 9 Shale, gray.0 5 Coal, soft..2 1 (6' 4") Eagle Coal (1685' B.) (Peter Keenan Mine)	6	685	80'
Concealed and dark sandy shale, Eagle	95	780	95'
Sandstone, massive, Lower War Eagle	30	810	

	Thickness. Feet.	Total. Feet.	
Concealed	5	815	
Coal blossom, Lower War Eagle (1555′ B.)	..	815	35′
Concealed	20	835	
Sandstone, massive, **Upper Gilbert**	25	860	
Shale, sandy, partly concealed	45	905	
Shale, dark	..	905	
Sandstone, massive, **Dotson**	25	930	
Shale, sandy	24	954	
Coal blossom, Douglas? (1415′ B.)	1	955	140′
Shale, and concealed to top of Upper Nuttall Sandstone (1390′ B.)	25	980	25′
(Section continued from top of Upper Nuttall Sandstone 1 mile southeast of Vinton, southward to Gauley River):			
New River Group (445′)			
Sandstone, massive, **Upper Nuttall**	95	1075	
Concealed	10	1085	
Sandstone, massive, pebbly, great cliff, **Lower Nuttall**	150	1235	255′
Concealed	90	1325	
Shale, black, and concealed	5	1330	
Coal blossom, Sewell "B" (1145′ B.)	..	1330	95′
Sandstone, massive	15	1345	
Coal blossom, Sewell "A" (1130′ B.)	..	1345	15′
Shale, dark, sandy and ferruginous, **Hartridge**	52	1397	
Coal, soft, Sewell (3′ 0″) (K. & M. R. R. Prospect) (1075′ B.)	3	1400	55′
Shale and concealed	15	1415	
Sandstone, massive, to Gauley River	10	1425	

The following section was measured with aneroid by the author southwestward along the hill road to the bed of Gauley River at Carnifex Ferry or mouth of Meadow River. The intervals represent practically vertical measurements, due to the lay of the strata in this region:

Carnifex Ferry Section, Nicholas County.

	Thickness. Feet.	Total. Feet.	
Kanawha Group (25′)			
Concealed from road summit	25	25	25′
New River Group (510′)			
Sandstone, **Upper Nuttall**, hard, current-bedded, grayish-white to brown	110	135	
Concealed	20	155	
Sandstone, **Lower Nuttall**, massive to current-bedded, conglomeratic, grayish-white, making bold sheer cliff	92	247	
Shale, 0″ to	2	249	

	Thickness. Feet.	Total. Feet.	
Coal, Hughes Ferry, exposed on south side of river in Staton Branch, (1450′ B.) 10″ to	1	250	225′
Shale	2	252	
Sandstone, current-bedded, medium-grained	18	270	
Concealed	188.5	458.5	
Coal, Sewell "B", (Opening No. 248 on Map II), south bank of river, closed, reported	1.5	460	210′
Sandstone, **Lower Guyandot,** grayish-white, pebbly, forms great cliff and rapids ½ mile below Ferry to bed of river, mouth Meadow River (1185′ B.)	55	515	
Interval (estimated)	18	533	
Coal, Sewell, at Opening No. 101 Map II, medium-hard, columnar, 1′ 10″ to	2	535	75′

About 5 miles southwestward in the southern edge of Falls District the author measured with aneroid the following section from the summit of Dogwood Ridge northwestward along the trail to Deitz P. O., thence northeastward along the road to the bed of Laurel Creek. Owing to the rapid rise of the rocks in the reverse direction from which the measurements were taken, the results are considerably greater than they should be, this being specially true for the thickness of the Upper Nuttall Sandstone which probably would not exceed 100 feet:

Deitz Section, Falls District.

	Thickness. Feet.	Total. Feet.	
Kanawha Group (470′)			
Concealed in steep slope from trail summit	15	15	
Concealed in bench, **Little Eagle Coal horizon**	10	25	25′
Concealed in steep slope	60	85	
Concealed in bench, **Eagle Shale horizon.**	10	95	70′
Coal blossom, Little Cedar (2200′ B.)	0	95	
Sandstone, **Lower War Eagle,** coarse, brown, friable	60	155	
Bench	10	165	
Concealed, steep slope	115	280	
Concealed, in bench, **Gilbert Coal horizon.**	10	290	195′
Sandstone, Dotson?, coarse, brown, friable	55	345	
Concealed and shale	125	470	180′
New River Group (160′)			
Sandstone, Upper Nuttall, pinkish cast and grayish-white, to bed of Laurel Creek, 0.7 mile southeast of Ramsey P. O.	160	630	160′

SPECIAL SECTIONS, KANAWHA DISTRICT.

Kanawha District lies immediately southwest from Falls, and, as in the latter, by far the greater portion of the surface rocks are those of the Kanawha Group of the Pottsville Series, although the New River Group and the basal portion of the Allegheny Series are represented as will readily be observed on Map II. In the northern point of Kanawha District the following succession is obtained by combining the spirit-level section measured by J. M. Jackson, mining engineer for Carver Bros. and published by I. C. White at the bottom of page 542 of Volume II(A) of the State Survey Reports, with a hand-level section measured by the author on the south hillside of Kanawha River along the incline to Coal Mine No. 1 on Map II at Crescent. It represents almost vertical measurements, as the results were determined practically on the strike of the strata. The section is very important in that it exhibits the position of the Alma Coal in the Kanawha Valley region and the true relative positions of the **"North Coalburg"** (Middle Kittanning) and **"No. 5 Block"** (Lower Kittanning) Coal beds:

Crescent Section, Kanawha District.

	Thickness. Feet.	Total. Feet.	
Allegheny Series (142.8')			
Sandstone, massive, **Lower Freeport**	20	20	
Coal, gas, Upper Kittanning	1.3	21.3	21.3'
Concealed, mostly sandstone, **Upper East Lynn**	52	73.3	
Coal, splint .3' 2" **Coal,** gas...1 0 } **"No. 6 Block", "North Coalburg", "Middle Kittanning".**	4.2	77.5	56.2'
Slate and concealed, mostly sandstone, **East Lynn**	58	135.5	
Coal, gas.....1' 3" **Coal,** splint...5 0 **Coal,** gas.....1 0 } **No. 5 Block—Lower Kittanning**	7.3	142.8	65.3'
Kanawha Group, Pottsville Series (887.2')			
Sandstone, **Homewood,** and concealed	58.2	201	
Kanawha Black Flint	5	206	63.2'
Shale	2	208	
Coal, Stockton	2	210	
Concealed	64	274	
Sandstone, coarse, gray to brown, current-bedded, **Upper Winifrede**	32	306	
Concealed	70	376	

	Thickness. Feet.	Total. Feet.	
Sandstone, platy, medium-grained, gray	14	390	
Concealed	120	510	
Coal blossom, Chilton	1	511	305′
Sandstone, medium-grained, micaceous	10	521	
Concealed	175	696	
Sandstone	25	721	
Concealed	35	756	
Sandstone, medium-grained, micaceous, greenish, Peerless	25	781	
Shale, sandy, and flaggy	15.7	796.7	
Coal, gas 1′ 0″ Shale, gray 0 1 **Alma** **Coal, gas** 0 8	1.7	798.4	287.4′
Shale, buff	1.6	800	
Sandstone, limy	1	801	
Shale, sandy, buff, iron ore nodules abundant	8.5	809.5	
Sandstone, green	4.5	814	
Shale, buff, sandy, iron ore nodules	1	815	
Coal, Peerless	2	817	18.6′
Shale, black, slightly siliceous, Lingulae fossils abundant	8	825	
Coal, No. 2 Gas, at old **W. R. Johnson Mine (No. 43 on Map II)**	5	830	13′
Concealed	48	878	
Shale, buff, sandy, iron ore nodules	15	893	
Concealed	49.5	942.5	
Coal, Eagle, at old **W. R. Johnson Mine (No. 76 on Map II)**	3.5	946	116′
Concealed to C. & O. R. R. grade at Crescent	50	996	
Concealed to Kanawha River	34	1030	84′

The two following sections of the basal portion of the Allegheny Series were measured with aneroid by the author directly above Mines Nos. 7 and 5 on Map II, 3 and 2 miles southward from Montgomery, respectively:

Morris Creek Section, Kanawha District.

	Thickness. Feet.	Total. Feet.
Allegheny Series (205′)		
Sandstone, massive, brown, making cliff, no pebbles	30	30
Concealed	10	40
Sandstone, **Upper East Lynn,** grayish-white, coarse, making cliff, no pebbles seen	75	115
Concealed	25	140
Sandstone, **East Lynn,** grayish-white, making cliff	60	200

	Thickness. Feet.	Total. Feet.
Coal, No. 5 Block, (Mine No. 7 on Map II) (1615′ B.), belonging 70 feet above crop of **Kanawha Black Flint**.........	5	205

Schuyler Fork, Morris Creek Section, Kanawha District.

Allegheny Series (236.5′)	Thickness. Feet.	Total. Feet.	
Concealed in steep slope from hill summit	70	70	
Bench, slight, **Upper Kittanning Coal** horizon..................................	5	75	75′
Sandstone, **Upper East Lynn**, grayish-white, partly concealed..............	70	145	
Concealed in steep slope.................	85	230	
Coal, No. 5 Block, (No. 5 on Map II), (1575′ B.), belonging 58 feet above crop of **Kanawha Black Flint**.........	6.5	236.5	161.5′

The following section of the Allegheny Series was measured with aneroid by the author:

Eagle—½ Mile South Section, Kanawha District.

Allegheny Series (120.6′)	Thickness. Feet.	Total. Feet.	
Sandstone, **Upper East Lynn**, platy bed, coarse-grained, top grayish-white and reddish-brown, from summit of mountain, no pebbles seen.................	35	35	
Concealed	5	40	40′
Bench, slight, **North Coalburg Coal horizon**	10	50	
Sandstone, medium-grained.25′ Concealed, steep slope.. ..13 } **East Lynn** Sandstone 15	53	103	
Slate	5	108	
Sandstone	5	113	
Shale	2	115	
Coal, No. 5 Block, at Mine No. 8 on Map II (1725′ B.), belonging 60 feet above crop of **Kanawha Black Flint**.........	5.6	120.6	80.6′

The following section, with some changes in correlation and additions at the base by the author was measured at the mouth of Armstrong Creek by I. C. White and published in Volume II of the State Survey, pages 371-2:

Mt. Carbon Section, Kanawha District.

	Thickness. Ft.	In.	Total. Ft.	In.	
Allegheny Series (100′ 4″)					
Sandstone, East Lynn, massive...	80	0	80	0	
Shale	10	0	90	0	
Coal ....1′ 8″					
Bone ....0 2 **No. 5 Block**..	5	4	95	4	
Block coal...3 6					
Concealed	5	0	100	4	100′ 4″
Kanawha Group, Pottsville Series (1114′ 8″)					
Sandstone, Homewood, massive...	65	0	165	4	
Concealed	5	0	170	4	
Kanawha Black Flint............	10	0	180	4	80′ 0″
Shale and concealed.............	12	0	192	4	
Coal, Stockton..................	3	0	195	4	
Sandstone and concealed.........	170	0	365	4	
Sandstone, massive, **Lower Winifrede**......................	60	0	425	4	
Concealed and shale.............	115	0	540	4	
Limestone, siliceous..............	2	0	542	4	
Sandstone, massive, gray.........	25	0	567	4	
Coal ....0′ 6″					
Shale 0 8					
Coal ....0 5 **Williamson**..	2	5	569	9	389′ 5″
Shale 0 6					
Coal 0 4					
Fire clay and concealed..........	5	0	574	9	
Sandstone, massive..............	20	0	594	9	
Shale, concealed, and sandstone..	20	0	614	9	
Concealed, probably holds **Cedar Grove Coal** near base........	20	0	634	9	65′ 0″
Sandstone and shale.............	20	0	654	9	
Sandstone, massive..............	25	0	679	9	
Shale and concealed.............	20	0	699	9	
Sandstone, Peerless..............	25	0	724	9	
Shale, sandy.....................	10	0	734	9	
Coal ....1′ 1″					
Shale ....0 1 **Alma**..	1	8	736	5	101′ 8″
Coal 0 6					
Shale, sandy.....................	12	0	748	5	
Coal, Peerless...................	2	0	750	5	14′ 0″
Shale, bluish.....................	15	0	765	5	
Coal, sulphurous....0′ 5 ″					
Slate 0 0½					
Coal 0 6					
Coal, splint...0 11 **No. 2 Gas**.	5	4	770	9	20′ 4″
Parting 0 0¼					
Coal 0 7					
Slate 0 0¼					
Coal 2 10					
Fire clay.........................	5	0	775	9	
Shale and sandstone, **Brownstown**	35	0	810	9	

	Thickness.		Total.		
	Ft.	In.	Ft.	In.	
Coal 1′ 0″ Shale 2 6 Coal 0 10 Powellton	4	4	815	1	44′ 4″
Shale and sandstone	15	0	830	1	
Coal, probably a split off Powellton	1	2	831	3	
Concealed and sandy shale	40	0	871	3	
Limestone, siliceous, Stockton	1	0	872	3	57′ 2″
Shale	10	0	882	3	
Coal 0′ 8″ Shale 1 4 Coal, slaty 0 6 Matewan	2	6	884	9	
Shale, sandy	20	0	904	9	
Coal 0′ 2″ Shale 0 8 Coal 2 10 Eagle	3	8	908	5	36′ 2″
Shale and sandy beds	20	0	928	5	
Coal, Little Eagle	1	6	929	11	21′ 6″
Fire clay and shale	5	0	934	11	
Sandstone, massive	10	0	944	11	
Shale, sandy	40	0	984	11	
Limestone, marine fossil 1′ 0″ Shale, dark, marine fossil 5 0 Eagle Limestone and Shale	6	0	990	11	61′ 0″
Shale, sandstone, and concealed	75	0	1065	11	
Shale, bituminous	2	0	1067	11	
Shale	30	0	1097	11	
Limestone, siliceous	1	0	1098	11	
Concealed	15	0	1113	11	
Shale, dark and sandy	15	0	1128	11	
Limestone, Dorothy ("Marsh Fork") (690′ B.)	2	0	1130	11	140′ 0″
Shale, Gilbert, black, marine fossils	9	1	1140	0	
Concealed	20	0	1160	0	
Sandstone	7	0	1167	0	
Shale, buff, sandy, and flaggy, to C. & O. R. R. grade	8	0	1175	0	
Concealed to Kanawha River, mouth of Armstrong Creek	40	0	1215	0	84′ 1″

In the above section, the basal 117 feet was added by the author from exposures immediately west of the C. & O. R. R. bridge over Armstrong Creek and connected with the Eagle Limestone

The following section was measured with aneroid by the author northward along the hill road to the Kanawha River, 0.4 mile west of Deepwater, the intervals being slightly excessive on account of a dip of 30 to 40 feet in the strata:

Deepwater Section, Kanawha District.

	Thickness. Feet.	Total. Feet.	
Kanawha Group (441′)			
Coal, Eagle?, visible	1	1	
Concealed and slate	14	15	
Coal, Little Eagle	1	16	
Sandstone	35	51	
Concealed	10	61	
Shale and sandstone	12.2	73.2	
Coal 0′ 3″ } Local	2.8	76	
Shale, gray 2 3			
Coal 0 3			
Sandstone	5	81	
Concealed	5	86	
Coal blossom	0	86	
Concealed and fire clay	15	101	
Shale, buff, sandy	35	136	
Sandstone	5	141	
Shale, buff, sandy	15	156	156′
Concealed, probably horizon of **Eagle Shale and Limestone**	7	163	
Shale, dark	1.5	164.5	
Coal, soft 1′ 0″ } **Lower War Eagle** (780′ B.)	1.5	166	10′
Shale, gray 0 3			
Coal, slaty 0 2			
Shale, sandy	5	171	
Sandstone, Upper and Lower Gilbert, medium-grained, current-bedded	50	221	
Shale, Gilbert, buff and black, **Lingula** fossils in upper 10′ abundant	35	256	
Concealed, with black slate	5	261	
Coal blossom, Gilbert (885′ B.)	0	261	95′
Sandstone, Dotson, current-bedded, buff, medium-grained	59	320	
Coal, gas, medium-soft, Douglas "A"	1	321	
Shale, black, and buff, sandy	11	332	
Sandstone, iron ore nodules, conglomeratic	1	333	
Shale, buff, sandy, iron ore nodules	1.3	334.3	
Coal, slaty 0′ 3″ } **Douglas** (810′ B.)	1.7	336	75′
Shale, gray 0 7			
Coal, slaty 0 11			
Shale, buff, sandy	5	341	
Sandstone, **Lower Dotson,** grayish-white	30	371	
Concealed	70	441	105′
New River Group (89′)			
Sandstone, Upper Nuttall, to C. & O. R. R. grade, 0.4 mile west of Deepwater Station	48	489	
Concealed to Kanawha River	41	530	89′

The following section was measured with aneroid by Teets in the northeastern edge of Kanawha District northeastward from an opening in the No. 2 Gas Coal bed, along the hill road on the head of Wilson Branch of Laurel Creek, almost along the strike of the strata:

Beckwith—1.7 Miles West Section, Kanawha District.

Kanawha Group (540')	Thickness. Feet.	Total. Feet.	
Shale, sandy, with iron ore nodules	5	5	
Coal, gas..0' 8" **Coal, semi-splint**....0 6 **Coal, gas**..2 9 **Coal, splint**.1 8 (1870' B.) **(Opening 311 on Map II)** (5' 7") **No. 2 Gas)—(J. A. Blake Opening)**	5.6	10.6	10.6'
Slate, ferriferous, and sandy and concealed	4.4	15	
Sandstone, coarse, micaceous, gray, Brownstown	30	45	
Concealed	10	55	
Coal blossom, Powellton	..	55	44.4'
Sandstone, massive, medium-grained	60	115	
Shale, sandy, and concealed	44	159	
Coal, (10"), Eagle?	1	160	105'
Concealed	39	199	
Coal (6"), Little Eagle?	1	200	40'
Sandstone, flaggy, fine-grained	24	224	
Coal	1	225	25'
Concealed	10	235	
Shale, sandy, and sandstone, flaggy	40	275	
Concealed	40	315	
Sandstone, massive, coarse, gray to buff	35	350	
Concealed	25	375	
Slate	5	380	
Concealed	20	400	
Concealed in bench	15	415	
Shale and concealed	75	490	
Coal (2"), (1340' B.)	..	490	265'
Shale, sandy	5	495	
Sandstone, coarse, friable, micaceous, gray	20	515	
Concealed	25	540	50'

Seven sections will now be given southward across Kanawha District on the waters of Armstrong Creek.

Kimberly Section, Kanawha District.

Kanawha Group (492')	Thickness. Feet.	Total. Feet.
Shale, buff, sandy, visible	12	12
Limestone, Campbell Creek, lenticular, 0" to	1.2	13.2
Shale, buff, siliceous, iron ore nodules	13	26.2

	Thickness. Feet.	Total. Feet.	
Coal, Peerless 2' 9" Slate, black, with thin **coal** streak 0 2 **Coal**, columnar, medium-hard 1' 6" / Slate, gray 0 3 / **Coal** columnar, medium-hard 3 5 — **No. 2 Gas** 5 2 **Campbell Creek** (1100' B.) (**No. 49 on Map II**)	8.1	34.3	34.3"
Shale	0.7	35	
Concealed	40	75	
Concealed, at spring water, **Powellton Coal horizon**	5	80	45.7'
Shale, sandy and flaggy	30	110	
Limestone, **Stockton**, lenticular, 0' to	1	111	
Shale, sandy and flaggy	24	135	
Coal, Matewan	0.7	135.7	
Shale	5	140.7	
Concealed	20	160.7	
Coal, Eagle, visible (975' B.)	1	161.7	81.7'
Fire clay shale	1	162.7	
Shale	4	166.7	
Concealed and **coal blossom, Little Eagle**	25.3	192	30.3'
Sandstone, flaggy, and shale, sandy	55	247	
Slate, black	4	251	
Shale, Eagle, sandy, dark marine fossils abundant (875' B.)	3	254	62'
Concealed to bed of Armstrong Creek, mouth of Tucker Hollow	238	492	238'

The above section was measured with aneroid by the author down the west hillside of Armstrong Creek via Mine No. 49 on Map II to the mouth of Tucker Hollow. It is very important, in that the **Peerless** and **No. 2 Gas** divisions of the **Campbell Creek Coal** are shown to be separated by only 2 inches of black slate, although only the No. 2 Gas division is being mined by the M. B. Coal & Coke Co., according to William Robinson, a temporary foreman. Other important "key-rocks" of the Kanawha measures — Campbell Creek Limestone, Stockton Limestone and Eagle Shale—are also present in the section.

One mile southwestward the following section was measured with aneroid by the writer down the west hillside of Armstrong Creek via Mines Nos. 10 and 50 on Map II in the No. 5 Block and No. 2 Gas Coal beds, respectively, the **Peerless** here being separated from the latter bed by an interval of 15 feet. Intervals are slightly less than they should be owing to a rise of about 25 feet in the strata between the top and bottom of the section:

Columbia Section, Kanawha District.

		Thickness. Feet.	Total. Feet.	
Allegheny Series (8')				
Coal, No. 5 Block, (sandstone roof) with partings, at Mine No. 10 on Map II (1865' B.)		8	8	
Kanawha Group (1142.5')				
Slate and concealed		47	55	
Kanawha Black Flint, typical		3	58	58'
Concealed		644	702	
Shale, sandy, buff		3.5	705.5	
Coal, Peerless, gas, medium-hard		2.5	708	
Shale, dark, argillaceous, fossils abundant		15	723	
Coal, gas	0' 9"			
Shale, gray	0 3½			
Coal, gas	0 5			
Slate, yellowish-gray	0 0½			
Coal, gas, visible	2 6			
Concealed	1 0			
No. 2 Gas Coal (Mine No. 50 on Map II) (1145' B.)		5	728	670'
Concealed		150	878	
Shale, buff		3.7	881.7	
Coal, Little Eagle, gas, soft		1.3	883	155'
Fire clay shale, gray		1	884	
Sandstone, shaly		14	898	
Shale, sandy		52	950	
Slate, black, with marine fossils	25'			
Sandstone, yellow, marine fossils abundant, many species	0.5			
Eagle Limestone		25.5	975.5	92.5'
Slate, black and brown		25	1000.5	
Sandstone, medium-grained		30	1030.5	
Concealed to bed of Armstrong Creek		120	1150.5	

The following very important section was measured with aneroid by the author eastward along a deep ravine, 0.6 mile northwest of the mouth of Jenkins Fork of Armstrong Creek, the change in the aneroid about compensating for the 10 to 15 feet of rise in the strata in this direction between the top and bottom exposures. The cloud-burst accompanying the great Cabin Creek flood of 1916 had swept the floor of this steep ravine clean of debris, giving a complete exposure of about 500 feet of a very important portion of the Kanawha Group, in that the true positions of the Williamson and Alma

Coals and the Seth Limestone are given in the type region of the latter division of the rock column. The coals in question possess here the same multiple-bedded character as in Boone, Logan, and Mingo Counties:

Columbia—1.2 Miles S. 50° W. Section, Kanawha District.

Kanawha Group (486.1′)				Thickness. Feet.	Total. Feet.	
Sandstone, flaggy, visible				15	15	
Shale, green				4.5	19.5	
Coal, gas				0.5	20	20′
Shale, argillaceous, gray				3	23	
Sandstone, flaggy				9	32	
Slate, black				2.5	34.5	
Coal, gas				0.5	35	15′
Sandstone and shale, green				10	45	
Sandstone				4	49	
Shale, green, iron ore nodules, and plant fossils				9.4	58.4	
Coal, Hernshaw, splinty				1.6	60	25′
Sandstone, Williamson, greenish-gray				27.3	87.3	
Coal, gas	0′	1½″	Williamson Coal (1280′ B.)	3.7	91	31′
Slate, black	0	0½				
Coal, gas	2	3				
Shale, gray	0	9				
Coal, gas	0	6				
Sandstone, Upper Cedar Grove, micaceous, greenish-gray				40	131	
Shale, buff, iron ore nodules, flaggy, siliceous, laminated				44.5	175.5	
Limestone, Seth, siliceous, marine fossils abundant				0.5	176	
Shale, buff, iron ore nodules				4.3	180.3	
Coal, gas	1′	3″	Cedar Grove Coal (1195′ B.)	3.7	184	93′
Shale, gray	0	9				
Coal, slaty	0	2				
Coal, gas	1	3				
Shale, dark	0	1				
Coal, gas	0	2				
Sandstone, Peerless, shaly				15.1	199.1	
Coal, gas	0′	4″	Alma Coal	2.9	202.0	18′
Shale, dark	1	0				
Coal, gas	0	9				
Shale, gray	0	2				
Coal, gas	0	8				
Shale, buff, sandy				12.2	214.2	
Limestone, Campbell Creek, siliceous, lenticular				2	216.2	
Shale, buff, sandy, laminated, iron ore nodules				28.4	244.6	
Coal, gas, Peerless				2.9	247.5	
Shale, black				1.7	249.2	

	Thickness. Feet.	Total. Feet.	
Coal, gas..1′ 8″ Shale, gray.0 10 **Coal**, gas..0 9 Shale, gray.0 3 **Coal**, gas..3 7 **No. 2 Gas Coal (No. 304 on Map II) (1120′ B.)**..	7.1	256.3	54.3′
Shale, gray	5	261.3	
Coal ......0′ 2″ Shale .....1 0 **Coal** ......0 4 Shale .....3 6 **Coal**, gas..0 10 **Lower Campbell Creek** (5′ 9″)	5.9	267.2	
Shale, argillaceous, dark-gray	2	269.2	
Sandstone, Brownstown, coarse, brown	18.5	287.7	
Coal, slaty......0′ 2″ Slate ....0 2 **Coal** ....0 2 Shale, dark.....0 3 **Coal**, gas........0 6 Slate, dark, hard.0 1 **Coal**, gas........2 2 **Powellton** (1085′ B.)	3.5	291.2	34.9′
Shale, gray, sandy	5.4	296.6	
Coal	0.7	297.1	
Shale, argillaceous, gray, iron ore nodules	16	313.1	
Limestone, siliceous.. 1′ 3″ Shale, dark, sandy, laminated..........12 3 **Limestone**, 0″ to..... 0 6 **Stockton Limestone**.	14	327.1	35.9′
Shale, dark, sandy, laminated	15	342.1	
Sandstone, ferriferous iron ore nodules in profusion	4.7	346.8	
Coal, Matewan	0.3	347.1	
Sandstone, **Eagle**	25	372.1	
Shale, flaggy and sandy	13.4	385.5	
Coal, slaty....0′ 2″ Shale, black, coal streaks.0 3 **Coal**, soft.....2 2 **Eagle Coal** (1000′ B.)	2.6	388.1	61′
Shale	3	391.1	
Sandstone, Decota, and flaggy shale	20.7	411.8	
Coal, Little Eagle	1.3	413.1	25′
Shale, flaggy	39	452.1	
Limestone	1	453.1	
Shale, flaggy, sandy	15	468.1	
Shale, sandy, flaggy, seen up ravine to west	12	480.1	
Limestone, Eagle?, siliceous, lenticular, no marine fossils seen	1	481.1	68′
Shale, sandy, flaggy, visible	5	486.1	5′

The following section was measured with aneroid by the author westward down the east hillside of Armstrong Creek via Mine No. 60 on Map II in the Powellton Coal, the latter in this locality belonging about 60 feet below the No. 2 Gas bed:

Elk Ridge Section, Kanawha District.

	Ft.	In.		Thickness. Feet.	Total. Feet.	
Kanawha Group (468.3′)						
Sandstone, Brownstown, flaggy and shaly, visible				3	3	
Shale, buff, sandy, iron ore nodules				6.4	9.4	
Coal, gas	0′	4″	**Powellton** (Mine No. 60 on Map II) (1445′ B.)	6.6	16	16′
Shale, dark-gray	0	2				
Coal, gas	0	3				
Shale, dark-gray, ½″ to	0	1				
Coal, columnar, medium-soft	2	4				
Shale, gray	0	2				
Coal, splint	0	4				
Coal, gas	0	6				
Shale, dark-gray	0	2				
Coal, soft, columnar	2	3				
Slate and concealed				30	46	
Shale, sandy				20	66	
Sandstone				40	106	
Concealed and slate				5	111	
Coal, gas, columnar	0′	8″	(Opening No. 377 on Map II) **Eagle** (5′ 2″) (1345′ B.)	5	116	100′
Bone	0	2				
Slate, gray	2	0				
Coal, soft, columnar	2	4				
Slate and concealed				15	131	
Sandstone				10	141	
Shale, buff, sandy				18	159	
Coal blossom, Little Eagle				2	161	45′
Concealed				2	163	
Sandstone				13	176	
Shale, sandy and flaggy				39	215	
Shale, dark, sandy				48	263	
Slate, black	3.5′		**Eagle Limestone and Slate**	4	267	106′
Sandstone, yellowish, marine fossils abundant	0.5					
Slate, black				19	286	
Sandstone, Lower War Eagle				30	316	
Concealed				45	361	
Slate, black, sandy				5	366	
Coal, soft	0′	3″	**Glenalum Tunnel** (1080′ B.)	2.3	368.3	101.3′
Slate, gray	0	1				
Coal, soft	2	0				
Sandstone, **Lower Gilbert**				15	383.3	
Concealed in steep slope				70	453.3	
Sandstone, **Dotson**				15	468.3	100′

The following section was measured with aneroid by the author southwestward along the floor of the steep ravine to the bed of Powellton Fork, ½ mile northwest of Powellton. The intervals are excessive owing to the dip of the rocks in the same direction:

Powellton—0.5 Mile Northwest Section, Kanawha District.

	Thickness. Feet.	Total Feet.	
Kanawha Group (1310′)			
Kanawha Black Flint, typical	10	10	10′
Concealed along ravine	256.3	266.3	
Sandstone, Upper Chilton, massive, making cliff	40	306.3	
Coal, Chilton, semi-splint (1840′ B.) (Mine No. 16 on Map II)	3.7	310	300′
Slate and concealed	60	370	
Sandstone, making great cliff, Hernshaw	40	410	
Shale, green, plant fossils abundant	5	415	
Coal 0′ 4″			
Shale, buff, sandy 5 0			
Coal, gas 0 2			
Shale, gray 0 8			
Coal, semi-splint 0 11 } **Hernshaw**	8.7	423.7	113.7′
Slate, black 0 4			
Coal, gas 0 10			
Slate, gray 0 4			
Coal 0 1			
Shale	1.3	425	
Sandstone	40	465	
Shale, dark	34.3	499.3	
Coal	0.7	500	76.3′
Shale, gray	3	503	
Concealed, with **coal blossom**	12	515	15′
Sandstone, making cliff	30	545	
Concealed	5	550	
Sandstone, green, micaceous	45	595	
Concealed	10	605	
Sandstone, green, micaceous, **Upper Cedar Grove**	75	680	
Concealed	29	709	
Coal, visible 12″, Cedar Grove	1	710	195′
Fire clay shale, siliceous	2	712	
Sandstone, green, micaceous, Peerless	38	750	
Shale, buff, sandy	27.7	777.7	
Coal, Peerless	2.3	780	
Shale, dark, argillaceous	1.5	781.5	
Coal, soft. No. 2 Gas (visible 18″) (1400′B.)	1.5	783	
Concealed	12	795	
Sandstone, Brownstown, gray, micaceous	29.3	824.3	
Coal, Powellton "A"	0.7	825	
Shale, dark, argillaceous	1.5	826.5	
Concealed and shale	22.5	849	
Coal 0′ 8″			
Shale 0 4 } **Powellton**	6	855	72′
Concealed 5 0			

	Thickness. Feet.	Total. Feet.	
Shale, sandy and flaggy, dark at bottom..	25	880	
Limestone, **Stockton**, dark, cherty, lenticular	2	882	
Slate, black, siliceous	20.6	902.6	
Shale, sandy, conglomeratic, with iron ore nodules	2	904.6	
Coal, Matewan	0.4	905	50′
Sandstone	15	920	
Coal, slaty	0.3	920.3	
Shale, sandy	9.7	930	
Concealed	20	950	
Sandstone	6	956	
Concealed	7	963	
Shale, sandy	5	968	
Coal, cannelly splint..0′ 5″ Bone ....0 1 **Coal**, soft, bright......1 6 } **Little Eagle** (1215′ B.)..	2	970	65′
Shale, flaggy, and sandy	44	1014	
Limestone, lenticular	1	1015	
Shale, flaggy and dark	15	1030	
Concealed	5	1035	
Shale, dark	10	1045	75′
Concealed, should hold **Eagle Limestone and Shale** near top	30	1075	
Sandstone, green, micaceous, current-bedded, **Lower War Eagle**	34.2	1109.2	
Coal, soft, columnar, Lower War Eagle...	0.8	1110	65′
Slate, black, sandy	21.7	1131.7	
Coal ....0′ 3″ Shale, gray......2 3 **Coal**, soft........0 9 } **Glenalum Tunnel** (1050′ B.)	3.3	1135	25′
Shale, sandy, and sandstone	7	1142	
Shale, bluish-black, sandy	12	1154	
Coal and slate, mixed	1	1155	20′
Sandstone, grayish-white, current-bedded, **Lower Gilbert**	20	1175	
Shale, bluish-black, laminated, **Gilbert**....	30	1205	
Concealed	15	1220	
Shale, bluish, sandy and flaggy	15.5	1235.5	
Coal, soft, columnar......1′ 0″ Shale, sandy....3 0 **Coal**, slaty......0 6 } **Gilbert** (945′ B.).	4.5	1240	85′
Sandstone, Dotson, grayish-white and brown, current-bedded	35	1275	
Shale, bluish-black, laminated, with iron ore nodules, to bed of Powellton Fork	35	1310	70′

The following succession of the strata is obtained by combining a section measured with aneroid by the author southwestward from the summit of the high knob, marked as a triangulation point on Maps I and II, with the log of the old Powellton test well for oil and gas—No. 14 on Map II—published on pages 502-3 of Volume I(a) of the State Survey Reports, located on the east bank of Powellton Fork, just above the C. &. O. R. R. station at Powellton. That portion above the well mouth represents almost vertical measurements since the results were determined from exposures almost on the strike of the strata:

Powellton Section, Kanawha District.

	Thickness. Feet.	Total. Feet.	
Allegheny Series (100′)			
Sandstone, grayish-white, coarse, small pebbles, **East Lynn**, capping knob, 0.7 mile northeast of Powellton, and concealed in steep slope	85	85	
Bench, flat, No. 5 Block Coal horizon	15	100	100′
Kanawha Group, Pottsville Series (1368′)			
Sandstone, grayish-white, current-bedded, making great cliff, **Homewood**	72.5	172.5	
Coal Stockton "A," at prospect	2.5	175	
Kanawha Black Flint, typical (2155′ B.)	10	185	85′
Concealed in bench, **Stockton Coal horizon**	10	195	
Sandstone, current-bedded, coarse-grained, grayish-white, making cliff, **Upper Coalburg**	65	260	
Concealed in slight bench, **Coalburg Coal horizon**	5	265	80′
Sandstone, current-bedded, medium-grained bottom, grayish-brown, coarser at top, **Lower Coalburg**	60	325	
Concealed in bench	15	340	
Sandstone, heavy-bedded, coarse, grayish-brown, making cliff, **Upper Winifrede**	40	380	
Concealed, steep slope	10	390	
Concealed in bench, **Winifrede Coal horizon**	10	400	135′
Sandstone, current-bedded, medium-grained, micaceous, greenish-gray, making cliff, **Lower Winifrede**	60	460	
Concealed, steep slope	15	475	
Concealed in gentle slope, mostly sandy shale	50	525	
Sandstone, **Lower Chilton?**, current-bedded, micaceous, greenish-gray, making cliff	55	580	
Concealed, bench	5	585	
Concealed, steep slope	35	620	
Concealed in bench	5	625	
Sandstone, current-bedded, greenish-gray, micaceous, making cliff	65	690	
Concealed, steep slope	15	705	
Concealed in bench	10	715	
Sandstone, making great cliff, on point, current-bedded, greenish-gray, micaceous, **Upper Cedar Grove**	60	775	

	Thickness. Feet.	Total. Feet.	
Concealed	50	825	
Sandstone	15	840	
Slight bench	5	845	
Sandstone, coarse, brown, **Peerless**	20	865	
Concealed	35	900	
Coal blossom and fragments, No. 2 Gas (1425′ B.) (No. 305 on Map II)	5	905	505′
Concealed	65	970	
Sandstone, flaggy	15	985	
Concealed with sandstone and shale intermixed	65	1050	
Coal blossom, Eagle	0	1050	145′
Sandstone, **Decota**, current-bedded	17	1067	
Concealed	1.5	1068.5	
Coal, Little Eagle	1.5	1070	20′
Sandstone, flaggy	30	1100	
Shale, buff and dark, sandy, laminated	19	1119	
Limestone, bluish-black, cherty, fairly pure, lenticular	1	1120	
Shale, dark, siliceous, coarse, no marine fossils seen	20	1140	
Concealed, should hold **Eagle Limestone** near middle	25	1165	95′
Sandstone, gray, current-bedded, micaceous, **Lower War Eagle**	50	1215	
Slate, siliceous	15	1230	
Slate, black, cannelly	7	1237	
Shale, gray, plant fossils abundant	1.8	1238.8	
Coal, Glenalum Tunnel (1085′ B.)	1.2	1240	75′
Shale, fire clay	5	1245	
Sandstone, current-bedded, gray, micaceous, **Lower Gilbert**	45	1290	
Shale, Gilbert, siliceous, iron ore nodules.	30	1320	
Concealed, (holds **Gilbert Coal** of last section)	5	1325	85′
Sandstone, grayish-white, current-bedded, **Dotson**	35	1360	
Shale, black, siliceous, iron ore nodules, to top **Powellton Well**	25	1385	60′
Continued with Powellton Well Record (No. 14 on Map II) (Casing Head, 935′ B.)			
Shale	48	1433	
Sandstone, gray.....18′ Shale .... 1 } **Lower Dotson** Sandstone, gray.....14	33	1466	
Slate	2	1468	83′
New River and Pocahontas Groups, Pottsville Series (937′)			
Sandstone, white, Upper and Lower Nuttall	195	1663	
Coal, Hughes Ferry	2	1665	197′
Sandstone	9	1674	
Shale	5	1679	
Sandstone, white, hard	11	1690	

	Thickness. Feet.	Total. Feet.	
Shale	305	1995	
Shale, black, limy	18	2013	
Lime, gray	4	2017	
Lime, buff-colored and sandy	3	2020	
Sandstone	3	2023	
Lime, white, sandy	43	2066	
Slate, black	3	2069	
Limestone	23	2092	
Sandstone, white and pebbly, Pineville?	93	2185	520′
Slate, black, and shale	50	2235	
Shale and lime, sandy	6	2241	
Shale	6	2247	
Lime and slate	23	2270	
Sandstone, pebbly, with gas	10	2280	
Clayey shale	9	2289	
Lime	13	2302	
Clayey shale	103	2405	220′
Mauch Chunk Series (600′)			
Shale, brown	15	2420	
Lime	33	2453	
Red rock and lime shell	192	2645	
Lime shell and slate	15	2660	
Red rock	50	2710	
Lime with shale pebbles	20	2730	
Lime	15	2745	
Red rock	48	2793	
Lime shell	7	2800	
Red rock, limy	60	2860	
Slate	21	2881	476′
Sandstone 34′ **Sandstone, hard, black** and white 22 **Maxton?**	56	2937	
Slate and lime shells	51	2988	
Limestone, white	3	2991	
Limestone, dark	9	3000	
Slate, **Pencil Cave**	5	3005	124′
Greenbrier Limestone (336′) (Top 685′ below sea-level)			
Lime, solid, "Big Lime" 60′ Slate 203 Lime, gray 42 Lime, mottled 13 Shale, black, limy 4 Lime, gray 14	336	3341	336′
Pocono Sandstone Series (500′)			
Shale, red, sandy, various colored pebbles 9′ Sandstone, dark, fine and hard 5 Shale, sandy, and sandstone, hard and fine 80 Sandstone, "rotten water", coarse, open-grained and pebbly 17 **Big Injun**	111	3452	

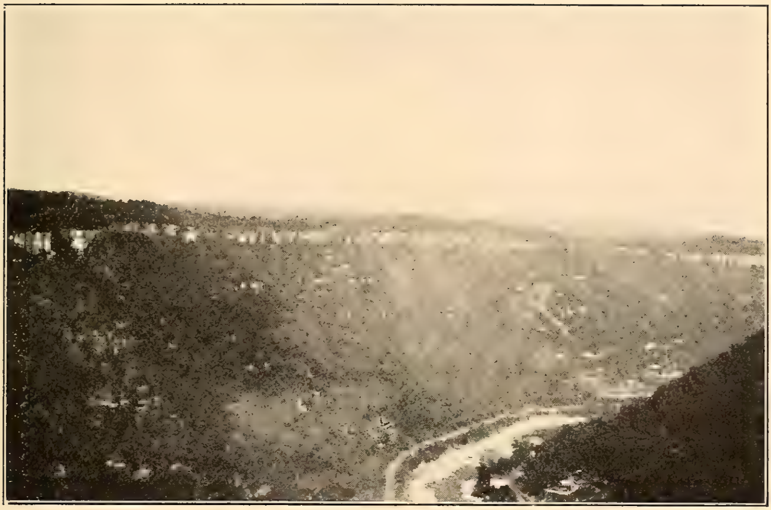

PLATE VI(a).—View looking northeast, showing New River gorge just below Nuttallburg, topography of Kanawha and New River Groups and outcrop of the great Lower Nuttall Sandstone near top of valley wall.

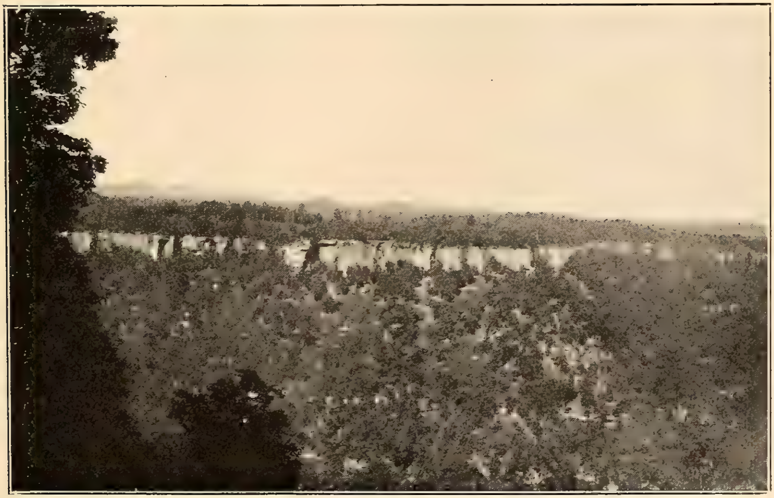

PLATE VI(b).—View looking northward, just below Kaymoor, showing the topography of Kanawha and New River Groups, and the outcrop of the great Lower Nuttall Sandstone along the north valley wall of New River.

	Thickness. Feet.	Total. Feet.	
Shale, gradually growing into hard impure limestone	73	3525	
Slate and shale	316	3841	500′
Devonian, Catskill Sandstone Series (439′)			
Slate and shale to bottom	439	4280	439′

The following section was measured with aneroid by the author southwestward via Mine No. 16A on Map II in the **Peerless Coal** along the incline to the same mine to railroad grade just above the mouth of Woodrum Branch of Powellton Fork. Here, only 13 feet of shale separate the Eagle and Little Eagle Coal beds. Five miles southward near Keeferton on Paint Creek this parting has thinned down to only one inch, the two beds being mined together and having a total thickness of 81 inches at Mine No. 83 on Map II. At Mine 16A above mentioned, the Peerless division of the Campbell Creek Coal, as in the Page region of Fayette, is mined as a separate and distinct bed, overshadowing in development the No. 2 Gas seam which has here been cut away to less than half its usual thickness by a local development of sandstone. The interval separating these two members of the original Campbell Creek Coal is generally occupied in the Kanawha Valley by a dark, argillaceous shale, carrying many plant fossils and frequently fauna of the genus **Lingula:**

Head of Powellton Fork Section, Kanawha District.

	Thickness. Feet.	Total. Feet.	
Kanawha Group (267′)			
Shale, buff, sandy	8	8	
Sandstone	2	10	
Shale, buff, sandy	9	19	
Coal, medium-soft, bright, columnar, Peerless, at Mine 16A on Map II	4	23	23′
Sandstone	25	48	
Coal, No. 2 Gas (1690′ B.)	1.4	49.4	26.4′
Fire clay and shale	2.6	52	
Sandstone	25.7	77.7	
Shale, black	0.3	78	
Shale, sandy	2	80	
Sandstone	18	98	
Concealed	35	133	
Coal, Powellton (1600′ B.)	5	138	88.6′
Slate and concealed	60	198	
Coal blossom, Matewan	0	198	

				Thickness. Feet.	Total. Feet.	
Concealed and sandstone				34	232	
Shale				5	237	
Coal, slaty	0′	6″	**Eagle Coal (1495′ B.)**	6	243	105′
Slate, gray	1	6				
Coal, soft	3	0				
Slate, black	0	2				
Coal, bony	0	10				
Shale, sandy				13	256	
Coal, soft, Little Eagle				2.3	258.3	15.3′
Shale, gray				1.7	260	
Sandstone to railroad grade				7	267	8.7′

Two miles eastward in the same District (Kanawha) on the waters of Loop Creek, the following succession of the coal beds of the Kanawha Group as prospected and determined by the Loup Creek Colliery Company was kindly furnished the Survey by C. E. Krebs of Charleston, W. Va., formerly of the Survey Staff, the correlations of the beds in the upper 846 feet being those of the author:

Section for Page Region, Kanawha District.

				Thickness. Feet.	Total. Feet.	
Kanawha Group (1048′)						
Interval from top of mountain				111.8	111.8	
Coal, hard	2′	9″	**Stockton?**	5.2	117	117′
Slate	0	8				
Coal, soft	1	9				
Interval				116	233	
Coal and slate	0′	4″	**Coalburg**	2	235	118′
Coal	1	8				
Interval				90.1	325.1	
Coal	0′	4″	**Winifrede (5′ 11″)**	5.9	331	96′
Slate	0	6				
Coal, cannel	0	11				
Slate	0	8				
Coal	3	6				
Interval				124	455	
Coal, Chilton (10″)				1	456	125′
Interval				85	541	
Coal	0′	4″	**Hernshaw ("Black Band")**	7	548	92′
Slate	0	3				
Coal	0	4				
Slate	3	2				
Coal	2	11				
Interval				92.4	640.4	
Coal	0′	11″	**Williamson**	2.6	643	95′
Slate	0	8				
Coal	1	0				
Interval				133	776	
Coal, Alma				1	777	134′

		Thickness. Feet.	Total. Feet.	
Interval		59.2	836.2	
Coal, Peerless....5' 0"	**Campbell Creek** (9' 9")	9.8	846	69'
Slate 1 3				
Coal, No. 2 Gas...3 6				
Interval		13.9	859.9	
Coal, Lower Campbell Creek		1.1	861	15'
Interval		38.6	899.6	
Coal, Powellton		1.4	901	40'
Interval		90.1	991.1	
Coal ....1' 0"	**Eagle** (6' 10")	6.9	998	97'
Slate 0 9				
Coal 1 7				
Slate 0 9				
Coal 2 9				
Interval		46.4	1044.4	
Coal, Little Eagle (3' 7")		3.6	1048	50'

Three miles southward in Kanawha District the author measured with aneroid the following section northward along the hill road on the head of Johnson Fork. The results are greater than they should be on account of a dip of about 70 feet in the strata between the exposures for the top and base of the section:

Head of Johnson Fork Section, Kanawha District.

Kanawha Group (505')		Thickness. Feet.	Total. Feet.	
Sandstone, flaggy				
Shale, buff, sandy		7.5	7.5	
Coal, soft.......0' 7"	(**Exposure No. 352 on Map II**) **Powellton** (2075' B.)	7.5	15	15'
Shale, gray......0 6				
Coal, slaty......0 3				
Coal, soft.......2 5				
Coal, slaty......0 4				
Shale, dark-gray.0 8				
Coal, soft.......2 9				
Shale, sandy		5	20	
Sandstone		55	75	
Concealed		25	100	
Coal blossom, Matewan		..	100	85'
Sandstone, shaly, **Eagle**		15	115	
Shale, sandy		18	133	
Coal blossom, heavy, Eagle (1950' B.)		2	135	35'
Sandstone		30	165	
Concealed and sandstone, shaly		333.8	498.8	
Coal, Gilbert (1585' B.) (**Exposure No. 448 on Map II**)		1.2	500	365'
Fire clay shale		5	505	5'

Three miles southwestward in the same District (Kanawha) Teets measured the following section with aneroid northwestward down the south hillside of Paint Creek via Mines Nos. 64 and 83 on Map II, in the No. 2 Gas and Eagle Coal beds, respectively, mostly along the incline to these operations, to the bed of the latter stream, ½ mile west of Keeferton. The intervals between important beds are greater than they should be, owing to a dip of 75 to 80 feet in the strata between the top and bottom exposures of the section. Here, as mentioned on a preceding page in the discussion of the Head of Powellton Fork Section, the Eagle and Little Eagle Coal beds have combined into one great seam, as revealed by adjacent exposure along the valley walls of Paint Creek:

Keeferton—½ Mile West Section, Kanawha District.

Kanawha Group (1095')				Thickness. Feet.	Total. Feet.	
Interval from top of mountain				300	300	
Coal, No. 2 Gas (2145' B.)				5	305	305'
Shale and concealed				105	410	
Sandstone and slate				1	411	
Coal	0'	8"	Powellton (2030' B.) (Mine No. 64 on Map II)	9	420	115'
Slate and bone	0	8				
Coal, gas	2	0				
Slate, black	0	8				
Coal	0	3				
Slate	0	7				
Coal, gas, columnar	4	2				
Concealed and sandstone				143.2	563.2	
Coal, gas	4'	1"	(6' 10") Eagle and Little Eagle beds, (Mine No. 83 on Map II)	6.8	570	150'
Slate, gray	0	1				
Coal	2	8				
Concealed and sandstone				90	660	
Slate, black, Eagle, marine fossils abundant				20	680	110'
Concealed and sandstone				75	755	
Slate, black				5	760	
Concealed				28	788	
Coal, Glenalum Tunnel? (1660' B.)				2	790	110'
Sandstone, Lower Gilbert				50	840	
Slate, black				15	855	
Concealed				45	900	
Sandstone, Dotson				35	935	
Shale, gray, slaty				20	955	
Slate, black				13	968	
Coal	0'	6"	Douglas ?	2	970	180'
Slate	0	4				
Coal	0	8				
Slate	0	3				
Coal	0	3				

	Thickness. Feet.	Total. Feet.	
Sandstone, **Lower Dotson**................	50	1020	
Concealed	75	1095	125′
New River Group (225′)			
Sandstone, **Upper and Lower Nuttall**.....	210	1305	
Slate, black, to bed of Paint Creek.......	15	1320	225′

Slightly over a mile westward on the same hillside of Paint Creek, the following section was obtained by Teets from determinations with spirit-level by the Milburn Coal Company northward via the latter's Mines Nos. 63 and 82 on Map II, in the Powellton and Eagle Coal beds, respectively. The measurements were made so nearly on the strike of the strata that the results represent practically vertical determinations. The interval between the base of the No. 2 Gas and the Eagle Coal beds—230 feet—is practically double that prevailing in the Montgomery region of Fayette County, 14 miles northward:

Kingston—1.7 Miles West Section, Kanawha District.

				Thickness. Feet.	Total. Feet.	
Kanawha Group (766.5′)						
Coal, gas, slate roof............	3′	4″	(Opening No. 338 on Map II) **No. 2 Gas** (2109′ L.)...	6.5	6.5	6.5′
Rock	0	1				
Coal	0	11				
Slate	0	8				
Coal	1	6				
Interval				110.8	117.3	
Coal, slate roof..	1′	6″	(Mine No. 63 on Map II) **Powellton** (1993′ L.) (5′ 2″)..........	5.2	122.5	116′
Fire clay........	0	1				
Coal	2	4				
Slate	0	5				
Coal	0	10				
Interval				90.3	212.8	
Sandstone, **Eagle**, visible..................				15	227.8	
Coal	1′	4″	**Eagle and Little Eagle** (1879′ L.) (Mine No. 82 on Map II)............	8.7	236.5	114′
Slate	2	2				
Coal	0	2				
Slate	0	8				
Coal, (slate floor)....	4	4				
Interval estimated to top of **Upper Nuttall Sandstone** and base of **Kanawha Group**				530	766.5	530′

Mr. J. C. Rawn, formerly general-manager of the Solvay Collieries Company, had a trench dug several years ago from the top of Lick Knob on the Raleigh-Fayette County Line, 1.8 miles south of Kingston, northward to Milburn Creek at the latter town, probably exposing the greatest number of minable coal beds yet found in the same hill in the State. Teets measured a hand-level section of these exposures and joined it to the log of the Gallego Land Company No. 1 Coal Test Boring—No. 15 on Map II, at the mouth of Rattlesnake Run, 1.5 miles northwest of Kingston, the results being published by C. E. Krebs in his Detailed Geologic Report of Raleigh County for the State Survey, pages 56-8. After a careful study of the published section, the author was convinced that an error had probably been made in tying the Coal (Douglas), 1555 feet from the top of the measured portion, to the top of the boring. Mr. Teets therefore was instructed to make a careful effort to trace the horizon of this coal to the boring in question, with the result that he found it belonged only 205 feet above the top of the boring instead of 340′ 2″. This necessarily resulted in some revisions of the correlations of several important members of this very complete and detailed section as shown in its following revised form:

Kingston Section, Kanawha District.

	Thickness.		Total.		
Allegheny Series (90′)	Ft.	In.	Ft.	In.	
Sandy shale and concealed from summit of Lick Knob........	83	0	83	0	
Coal, No. 5 Block, Lower Kittanning........................	7	0	90	0	90′ 0″
Kanawha Group, Pottsville Series (1540′)					
Sandstone, Homewood............	74	0	164	0	
Coal, Stockton "A"..............	6	0	170	0	80′ 0″
Sandstone	48	4	218	4	
Coal ....1′ 8″ Shale, sandy and concealed.....6 8 Coal ....4 4 Stockton	12	8	231	0	61′ 0″
Sandstone and shale, sandy......	155	6	386	6	
Coal, Coalburg..................	3	6	390	0	159′ 0″
Shale, sandy....................	9	0	399	0	
Coal, Little Coalburg............	1	0	400	0	
Sandstone, Upper Winifrede......	37	8	437	8	
Coal, Winifrede..................	2	8	440	4	50′ 4″
Shale, sandy.....................	12	4	452	8	
Coal, Lower Winifrede...........	2	4	455	0	

	Thickness.		Total.		
	Ft.	In.	Ft.	In.	
Shale, sandy	59	4	514	4	
Coal, Chilton "A"	0	8	515	0	74′ 8″
Shale, sandy, and concealed	127	0	642	0	
Coal, Little Chilton	3	0	645	0	
Shale, sandy	36	10	681	10	
Coal, Hernshaw, "Black Band"	3	2	685	0	170′ 0″
Sandstone and shale, sandy	56	11	741	11	
Coal, Williamson	3	1	745	0	60′ 0″
Shale, sandy	9	2	754	2	
Coal	0	10	755	0	
Sandstone and shale, sandy	118	4	873	4	
Coal ....1′ 8″ Shale, sandy..7 10 } **Alma** **Coal** 2 2	11	8	885	0	140′ 0″
Sandstone, massive, **Monitor**	51	8	936	8	
Coal, Peerless	3	4	940	0	
Shale, sandy, and concealed	34	4	974	4	
Coal, No. 2 Gas, visible	0	8	975	0	90′ 0″
Shale, sandy	33	10	1008	10	
Coal, Lower Campbell Creek	1	2	1010	0	
Sandstone, massive, **Brownstown**	23	0	1033	0	
Coal, Powellton "A"	2	0	1035	0	
Shale, sandy	4	4	1039	4	
Coal, Powellton	5	8	1045	0	70′ 0″
Shale, sandy, and concealed	78	6	1123	6	
Coal, Matewan	1	6	1125	0	
Sandstone, Eagle	35	0	1160	0	
Shale, sandy and slaty	7	3	1167	3	
Coal, Eagle and Little Eagle, combined	7	9	1175	0	130′ 0″
Sandstone and sandy shale	90	0	1265	0	
Black slate, Eagle, marine fossils abundant (supplied from Keeferton Section)	20	0	1285	0	110′ 0″
Shale, sandy	57	6	1342	6	
Coal, Lower War Eagle	2	6	1345	0	60′ 0″
Shale, sandy	27	8	1372	8	
Coal, Glenalum Tunnel, upper bench	2	4	1375	0	
Shale, sandy, and sandstone	27	5	1402	5	
Coal, Glenalum Tunnel, lower bench	2	7	1405	0	60′ 0″
Sandstone, Lower Gilbert, and shale, sandy	84	7	1489	7	
Coal, Gilbert	0	5	1490	0	85′ 0″
Sandstone, Dotson, and shale, sandy	62	0	1552	0	
Coal, Douglas	3	0	1555	0	65′ 0″
Sandstone, Lower Dotson, shale, sandy, and concealed	75	0	1630	0	75′ 0″
New River and Pocahontas Groups, Pottsville Series (1087′ 10″)					
Sandstone, Upper and Lower Nuttall, making great cliff along Paint Creek, to top Bore Hole No. 15 on Map II	130	0	1760	0	

		Thickness. Ft.	Thickness. In.	Total. Ft.	Total. In.	
(Continued with log of Gallego Land Company Boring No. 15 on Map II)						
Surface debris		12	0	1772	0	
Shale		14	0	1786	0	
Sandstone		3	0	1789	0	
Coal, Hughes Ferry, Iaeger		0	10	1789	10	159′ 10″
Sandstone		2	0	1791	10	
Shale, sandy		6	0	1797	10	
Sandstone		16	0	1813	10	
Slate		1	0	1814	10	
Shale, sandy		1	11	1816	9	
Shale, dark		9	0	1825	9	
Shale, sandy		1	7	1827	4	
Shale, dark		2	0	1829	4	
Sandstone, hard, flinty		3	4	1832	8	
Shale, sandy		1	2	1833	10	
Sandstone, hard, broken, Harvey		52	0	1885	10	
Shale, dark, sandy		8	6	1894	4	
Slate, dark		7	3	1901	7	
Sandstone, hard, Guyandot		43	2	1944	9	
Shale, dark		0	1	1944	10	
Sandstone, hard 70′ 6″ Sandstone, conglomeratic... 7 0	**Lower Guyandot**	77	6	2022	4	
Coal, dirty, Sewell		1	0	2023	4	233′ 6″
Sandstone, brown		4	6	2027	10	
Shale, sandy, hard		9	6	2037	4	
Shale, dark, sandy		14	0	2051	4	
Shale, hard, sandy		29	0	2080	4	
Sandstone, hard		1	0	2081	4	
Shale, hard, sandy		2	0	2083	4	
Sandstone, hard		4	0	2087	4	
Shale, hard, sandy		3	6	2090	10	67′ 6″
Sandstone, hard 14′ 6″ Sandstone, conglomeratic .. 11 0 Sandstone, hard 11 0 Sandstone, black shale and coal **streaks (Little Raleigh)**..... 56 0	**Upper Raleigh Sandstone**	92	0	2182	10	
Sandstone conglomeratic .. 9′ 0″ Shale, dark.... 2 0 Sandstone, hard 3 0 Sandstone, conglomeratic .. 21 0 Shale, dark... 8 6 Shale, sandy... 2 6 Sandstone, hard 43 0	**Lower Raleigh Sandstone**	89	0	2271	10	
Shale, blue		1	0	2272	10	

	Thickness. Ft.	In.	Total. Ft.	In.	
Sandstone, hard 35′ 6″ Sandstone, conglomeratic .. 0 6 Sandstone, hard 4 0 Sandstone, conglomeratic .. 23 0 Sandstone, hard 21 0 **Quinnimont Sandstone**	84	0	2356	10	
Coal and dark shale, Fire Creek	0	4	2357	2	266′ 4″
Shaly clay	0	3	2357	5	
Shale, sandy	14	11	2372	4	
Shale, dark	4	3	2376	7	
Shale **and coal, Little Fire Creek**	1	0	2377	7	20′ 5″
Shale, dark	0	3	2377	10	
Shale, sandy	8	0	2385	10	
Sandstone	31	0	2416	10	
Sandstone, with shale partings	1	0	2417	10	
Sandstone	30	0	2447	10	
Sandstone, with slate seam	28	6	2476	4	
Sandstone	9	6	2485	10	
Sandstone, conglomeratic	0	6	2486	4	
Sandstone	7	0	2493	4	
Shale, dark	9	6	2502	10	
Sandstone	2	0	2504	10	
Sandstone, with shale spots	6	0	2510	10	
Sandstone	29	0	2539	10	
Shale, dark, sandy	169	0	2708	10	
Sandstone, hard	11	0	2719	10	342′ 3″
Mauch Chunk Series, Mississippian (40′)					
Limestone, bastard, conchoidal	11	0	2730	10	
Limestone and shale, mixed	18	0	2748	10	
Red shale	3	0	2751	10	
Green lime	3	0	2754	10	
Red shale to bottom of hole	5	0	2759	10	40′ 0″

SPECIAL SECTIONS, MOUNTAIN COVE DISTRICT.

Mountain Cove District lies immediately on the north side of New River and south of Falls District, and, like the latter area, its surface rocks belong mostly in the Kanawha and New River Groups of the Pottsville Series, although there are a few scattered remnants of the Allegheny Series along the crest of Gauley Mountain ridge and its spurs. In the northern border the following section was measured with aneroid by the author from the triangulation point on the summit of the high knob, 1¼ miles northwest of Ansted, southward mostly along the second-class road to near the road fork, one-eighth mile southwest of the railway station for the latter place. That for the

New River Group represents almost vertical measurements on the steep valley walls of Mill Creek down to the bed of New River at Hawks Nest, and this portion is in close agreement with the results obtained by Maj. Wm. N. Page, published by I. C. White on pages 273-4 of Volume II(A) of the State Survey Reports. The same is not true, however, for that portion included within the Kanawha Group, as the results are much less than they should be owing to a rise in the strata of about 200 feet to the southeast between the top and bottom exposures:

Ansted—Hawks Nest Section, Mountain Cove District.

		Thickness. Feet.	Total. Feet.	
Allegheny Series (110')				
Concealed, steep slope, from triangulation point top of knob		105	105	
Concealed in bench, **No. 5 Block Coal horizon**		5	110	110'
Kanawha Group, Pottsville Series (1045')				
Concealed, steep slope		62	172	
Kanawha Black Flint, and concealed		10	182	72'
Shale, argillaceous		10	192	
Coal, gas, medium-hard 1' 8"	**Stockton Coal (2335'B.)**. (Opening No. 275 on Map II) 8' 6"	8.5	200	18.5'
Bony slate, black 0 6				
Shale, dark 0 4				
Coal, splint, slightly bony 3 0				
Coal, splinty, good 3 0				
Concealed and **coal blossom, split off Stockton bed**		20	220	
Sandstone, **Upper Coalburg**, medium-coarse-grained, greenish-gray		25	245	
Concealed in bench		10	255	
Shale, sandy		7	262	
Concealed		3	265	
Coal blossom (2270' B.)		0	265	
Sandstone, flaggy		7	272	
Concealed		2	274	
Coal blossom		1	275	
Sandstone, coarse, brown and gray, **Upper Coalburg**		23	298	
Coal 1' 0"	**Coalburg (2205'B.)**	12	310	110'
Shale, gray. 1 0				
Coal, softer 1 0				
Shale, gray. 2 0				
Coal, splint. 4 0				
Slate 2 0				
Coal 1 0				

	Thickness. Feet.	Total. Feet	
Concealed in bench	10	320	
Shale, buff, sandy	25	345	
Concealed in bench, and fire clay shale **(Winifrede Coal horizon)**	20	365	55′
Sandstone	35	400	
Concealed	5	405	
Shale, sandy	9.4	414.4	
Coal (7") Chilton?	0.6	415	50′
Sandstone	33	448	
Concealed	2	450	
Coal blossom, Hernshaw?	..	450	35′
Concealed	15	465	
Shale, sandy, buff	10	475	
Concealed	9	484	
Coal blossom, Williamson?	1	485	35′
Concealed in bench and shale	25	510	
Sandstone	20	530	
Concealed	5	535	
Sandstone	30	565	
Shale, sandy	15	580	
Concealed	5	585	
Coal blossom, Cedar Grove	..	585	100′
Concealed	55	640	
Sandstone, flaggy and massive, greenish, **Peerless**	30	670	
Concealed	10	680	
Coal blossom, No. 2 Gas, on bench (1820′ B.)	5	685	
Concealed	25	710	
Sandstone, Brownstown	25	735	
Concealed	8.8	744	
Coal, soft, (14" visible), **Powellton**	1.2	745	160′
Shale	2	747	
Sandstone	5	752	
Concealed	2	754	
Coal, soft, Matewan?, (12" visible), with 1" gray shale, 5" from bottom	1	755	
Shale	15	770	25′
Concealed, should hold **Eagle Coal** near top	65	835	
Shale, sandy, flaggy, buff	15	850	
Concealed	10	860	
Sandstone	5	865	
Shale	5	870	
Slate, black, Eagle	10	880	110′
Concealed, bench	5	885	
Shale, buff	5	890	
Sandstone, coarse, Upper Gilbert	30	920	
Concealed	14.5	934.5	
Coal, Glenalum Tunnel, soft, gas, visible 6"	0.5	935	55′
Fire clay shale	5	940	
Shale, buff, dark, sandy, and flaggy	35	975	
Shale, Gilbert, black, sandy layers with typical "Mt. Carbon" and "Dorothy" Limestone pelecypod fossils and Lingulae	8	983	
Slate, cannel, black, plant fossils and fruit of same, abundant	2	985	

	Thickness. Feet.	Total. Feet.	
Shale, black, sandy, and buff	5	990	
Shale, sandy, buff	20	1010	
Concealed and shale, should hold **Gilbert Coal** near top	15	1025	90′
Sandstone, Dotson, coarse, friable, brown	45	1070	
Shale	5	1075	50′
Concealed, holding **Douglas Coal horizon** near top	35	1110	
Sandstone, Lower Dotson, friable, soft, weathers badly, reddish-brown, large concretionary masses of same genedal type as in Clear Fork Gap Section (Wyoming-McDowell Report)	30	1140	
Concealed	5	1145	
Fire clay and concealed to top of Upper Nuttall Sandstone cliff ⅛ mile southwest of Ansted Railroad Station	10	1155	80′
New River Group (580′)			
Sandstone, massive, grayish-white, medium-grained, making great cliffs, **Upper Nuttall**	85	1240	
Shale and concealed, 0″ to	10	1250	
Sandstone, massive, pebbly to conglomeratic, grayish-white, making great cliff, **Lower Nuttall**	90	1340	
Shale, sandy	8	1348	
Coal, "Hughes Ferry," "Iaeger"	2	1350	195′
Shale, sandy, laminated	50	1400	
Sandstone, massive, pebbly, Harvey Conglomerate, making great cliff	100	1500	
Shale, dark, sandy, laminated	15	1515	
Shale, sandy, with sandstone layers	8	1523	
Coal, bony and slaty, Castle	2	1525	175′
Sandstone, massive, Guyandot, making great cliff	50	1575	
Shale, black, sandy, plant fossils, 6″ to	7	1582	
Coal, bony.. 6″ to 0′ 2″ **Coal soft,** columnar.. **30 to 2 10** } **Sewell** (960′B.) (Mine No. 102 on Map II)	3	1585	60′
Fire clay shale, gray	5	1590	
Slate, sandy, laminated	25	1615	
Coal, Welch	0.5	1615.5	30.5′
Shale, sandy	54.5	1670	
Sandstone, hard, pebbly, **Upper Raleigh**	60	1730	
Coal, Little Raleigh, Coal Exposure No. 260 on Map II, reported 5′ thick by W. H. Evans of Ansted, in excavations for C. & O. Railway bridge piers at Hawks Nest	5	1735	119.5′

Two and a half miles northeastward in the same District, the author measured with aneroid the following section from the summit of a high knob, 0.8 mile southwest of Mulvane, westward to the road summit at the low gap between Horseshoe and Shade Creeks and thence southwestward along the hill road on the latter stream, practically on the strike of the strata:

Mulvane—1 Mile Southwest Section, Mountain Cove District.

	Thickness. Feet.	Total. Feet.	
Kanawha Group (740')			
Sandstone, **Williamson**, green, micaceous, current-bedded, from top of knob.......	45	45	
Concealed in bench, **Williamson Coal horizon**	10	55	55'
Sandstone, **Upper Cedar Grove**, green, micaceous, current-bedded, making cliff......	65	120	
Concealed, steep slope....................	10	130	75'
Concealed, in bench, **Cedar Grove Coal horizon**	10	140	
Concealed, steep slope, mostly green, micaceous, current-bedded sandstone........	20	160	
Concealed in bench.......................	15	175	
Concealed, should hold **No. 2 Gas Coal** near middle..............................	60	235	105'
Sandstone, coarse, brown, Brownstown....	55	290	
Shale, sandy	15	305	
Concealed	20	325	
Coal blossom, Powellton.................	..	325	
Shale, sandy.............................	20	345	
Coal, medium-soft 1' 0" Bone, 2" to...... 0 3 **Coal** .... 0 3 Shale, 2" to...... 0 3 **Coal**, medium-soft 3 3 } **Eagle Coal** (1830' B.) (Opening No. 374A on Map II)....	5	350	115'
Concealed	15	365	
Coal blossom, trace......................	..	365	
Shale, buff, sandy.......................	39	404	
Coal, soft, Little Eagle (1760' B.)..........	1	405	55'
Shale	5	410	
Concealed	20	430	
Concealed, mostly black, sandy shale......	5	435	
Slate, black, Eagle, marine fossils (1735' B.)	5	440	35'
Concealed and shale......................	5	445	
Sandstone, concealed, brown, friable, Upper Gilbert	50	495	
Concealed	10	505	
Shale, buff, sandy.......................	20	525	
Concealed, should hold **Gilbert Coal** horizon	10	535	95'
Shale, black, siliceous..................	15	550	
Shale, buff, sandy.......................	50	600	
Concealed	24	624	
Concealed ... 0' 2" Shale, gray... 0 5 **Coal**, slaty... 0 3 } 10" **Douglas Coal**....	1	625	90'
Shale, buff, sandy.......................	5	630	
Sandstone, **Lower Dotson**, soft, coarse, brown, friable..........................	40	670	

	Thickness. Feet.	Total. Feet.	
Coal, lenticular (4″)	0	670	
Sandstone, shaly	20	690	
Concealed	5	695	
Sandstone	5	700	
Concealed	10	710	
Shale, sandy	10	720	
Shale, black, **Douglas**	10	730	
Concealed to top **Upper Nuttall Sandstone**, 0.9 mile northeast of Victor P. O., and base **Kanawha Group**	10	740	115′

SPECIAL SECTIONS, NUTTALL DISTRICT.

Nuttall District also lies on the north side of New River, immediately east of Mountain Cove District. Its outcropping rocks belong mostly in the Kanawha and New River Groups of the Pottsville, although New River has cut down almost through the Pocahontas Group in the southwest margin.

In the northern point of the District the author measured the following section with aneroid northeastward along the hill road to the top of the **Nuttall Heirs Coal Test Boring—No. 18 on Map II,** on the west bank of Meadow River, 0.2 mile northwest of Shawver Bridge and just below the mouth of Hedricks Creek. The Survey was unable to obtain the log of this boring to make the section more complete. Results are greater than they should be on account of a dip in the strata of 45 to 50 feet between the top and bottom exposures:

Shawver Bridge Section, Nuttall District.

	Thickness. Feet.	Total. Feet.	
New River Group (345′)			
Sandstone, Upper Nuttall, grayish-white and pink, upper part, to road summit	100	100	
Shale, buff, sandy, and concealed	15	115	
Sandstone, grayish-white, conglomeratic, massive, making great **cliff, Lower Nuttall** (60′ visible)	110	225	225′
Concealed and shale	5	230	
Sandstone, current-bedded	6	236	
Shale, dark, sandy, flaggy	14	250	
Concealed	20	270	
Shale, dark, siliceous, laminated	15	285	
Concealed	25	310	
Coal blossom, Castle (1635′ B.)	0	310	85′

	Thickness. Feet.	Total. Feet.	
Sandstone, **Guyandot**, current-bedded, grayish-white and brown	10	320	
Concealed to **Coal Test Boring No. 18 on Map II**	25	345	35′

Slightly over 4½ miles southeastward up Meadow River the author measured the following section with aneroid in the edge of Nicholas County from the road summit, 0.8 mile northeast of Miller P. O., southwestward along the hill road to the bed of the latter River just below the mouth of Youngs Creek, practically on the strike of the rocks:

Miller Section, Nicholas County.

	Thickness. Feet.	Total. Feet.	
New River Group (440′)			
Sandstone, **Lower Nuttall**, massive, grayish-white, cliff, small pebbles, from road summit (2307′ L.) 1 mile northeast of Miller P. O.	100	100	100′
Concealed in bench	15	115	
Concealed	15	130	
Sandstone, broken	10	140	
Concealed	5	145	
Shale, gray, argillaceuos	5	150	
Shale, bluish-black	5	155	
Shale, buff, sandy	15	170	
Concealed	59.5	229.5	
Coal, soft, (visible 6″) Castle	0.5	230	130′
Fire clay shale	1	231	
Sandstone, current-bedded, grayish-white	19	250	
Concealed	65	315	
Sandstone, grayish-white, hard, **Guyandot**	40	355	
Concealed	5	360	
Shale, buff and dark	5	365	
Sandstone, grayish-white, hard, **Lower Guyandot**	22	387	
Shale, buff	5	392	
Coal, soft, Sewell, upper bench	1.5	393.5	163.5′
Concealed	8.5	402	
Shale, brown and sandy	10.8	412.8	
Coal, soft, Sewell, lower bench, (Exposure No. 468 on Map II) (1900′ B.)	2.2	415	21.5′
Shale, buff	10	425	
Concealed to Meadow River at bridge, just below mouth of Youngs Creek	15	440	25′

Two and a half miles southward on the eastern edge of the same District (Nuttall), the following succession of the strata is obtained by combining a section measured with aneroid by the author eastward down the west hillside of Meadow River, just below Russellville, with the detailed log of the **Mrs. E. T. Martin Coal Test Boring—No. 26 on Map II**—located on the east side of the latter stream, 0.1 mile east of the mouth of Brackens Creek, in the edge of Greenbrier County, the record of which was kindly furnished the Survey by Samuel Stephenson of Charleston, West Virginia:

Russellville Section, Nuttall District.

	Thickness.		Total.		
	Ft.	In.	Ft.	In.	
New River Group (676′ 3″)					
Concealed in gentle slope with small, hard, grayish-white boulders from summit of hill	65	0	65	0	
Concealed in bench	10	0	75	0	
Sandstone, grayish-white	20	0	95	0	
Concealed in bench	15	0	110	0	
Sandstone, current-bedded, grayish-white, **Guyandot**	30	0	140	0	
Concealed, mostly sandstone	25	0	165	0	
Shale, buff, sandy	20	0	185	0	
Coal, Sewell "B" and concealed	10	0	195	0	195′
Concealed	5	0	200	0	
Sandstone, current-bedded, **Lower Guyandot**	25	0	225	0	
Concealed	3	6	228	6	
Coal, Sewell, (Opening No. 465 on Map II) (2045′ B.)	1	6	230	0	35′
Concealed, steep slope, mostly sandstone	45	0	275	0	
Concealed, gentle slope	25	0	300	0	
Concealed, steep slope	10	0	315	0	85′
Sandstone, grayish-white, making cliff, **Upper Raleigh**	45	0	360	0	
Concealed to top of coal boring	5	0	365	0	50′
(Continued with log of Mrs. E. T. Martin Boring No. 26 on Map II) (Elevation top of hole—1930′ B.):					
Surface	10	0	375	0	
Sandstone, **Upper Raleigh**	10	0	385	0	
Slate, gray	57	0	442	0	77′
Bone, Little Raleigh Coal	0	4	442	4	
Sandstone, hard, Lower Raleigh	26	0	468	4	
Slate, gray	65	3	533	7	
Shale, dark, sandy	17	10	551	5	
Slate, gray	27	5	578	10	
Sandstone and shale	4	7	583	5	
Sandstone, **Quinnimont**	40	7	624	0	
Sandstone, pebbly	2	0	626	0	

	Thickness. Ft.	In.	Total. Ft.	In.	
Sandstone to horizon of **Fire Creek Coal**	2	0	628	0	186′
Bastard fire clay.................	3	6	631	6	
Sand shale......................	10	8	642	2	
Slate, gray......................	12	5	654	7	
Slate, black......................	1	2	655	9	
Coal, dirty, Little Fire Creek.....	1	8	657	5	29′ 5″
Bastard fire clay................	1	5	658	10	
Sandstone, Pineville.............	11	2	670	0	
Coal, No. 9 Pocahontas (No. 6 Pocahontas?)	1	2	671	2	
Bastard fire clay.................	2	0	673	2	
Sandstone	3	1	676	3	18′ 10″
Pocahontas Group (56′ 9″)					
Shale, dark, sandy ..... 6′ 6″ Slate, gray... 6 7 Sandstone ... 4 0 **Flattop Mountain Sandstone** ..	17	1	693	4	
Shale, dark, sandy, to horizon of **No. 7 Pocahontas Coal**.........	5	9	699	1	
Bastard fire clay.................	1	10	700	11	
Shale, sandy.....................	15	4	716	3	
Sandstone, Pierpont.............	9	4	725	7	
Slate, black, **Royal Shale**.........	1	1	726	8	
Coal, No. 6 Pocahontas (No. 3 Pocahontas?)	2	5	729	1	52′ 10″
Bastard fire clay.................	2	0	731	1	
Sandstone to bottom of hole......	1	11	733	0	3′ 11″

Four miles westward in the same District, the author measured the following section from the top of "Spy Rock"—a Lower Nuttall Sandstone cliff exposure—southeastward along the hill road to the road fork at Divide and thence southwest along a hill road to the crop of the Sewell Coal. There is probably not over 10 to 15 feet difference in structural level of the top and bottom exposures of the section, so the results represent almost vertical determinations:

Divide Section, Nuttall District.

	Thickness. Feet.	Total. Feet.	
New River Group (350′)			
Sandstone, Lower Nuttall, grayish-white, making cliff..............................	20	20	
Shale, buff..............................	14.1	34.1	
Coal, Hughes Ferry, 10″ with ½″ gray slate 4″ above base...........................	0.9	35	35′
Fire clay shale..........................	5	40	

	Thickness. Feet.	Total. Feet.	
Sandstone with shale layer	35	75	
Shale, buff, sandy	25	100	
Concealed and shale	15	115	80′
Sandstone, grayish-white, current-bedded	45	160	
Shale, buff	15	175	
Sandstone, **Harvey**, grayish-white, current-bedded, ripple-marked	70	245	
Shale, buff and dark	10	255	140′
Sandstone, Guyandot, grayish-white, current-bedded, to road fork	25	280	
Concealed	66.3	346.3	
Coal, soft, columnar 3′ 6″ **Coal**, slaty, (shale floor) 0 2 } **Sewell** (2195′ B.)	3.7	350	95′

Slightly less than 2 miles farther to the southwest, the author measured the following section with aneroid southeastward down the north hillside of Keeney along the hill road to the road fork at Winona. Here the results are much less than they should be, owing to a rise of about 100 feet in the strata between the top and bottom exposures of the section:

Winona Section, Nuttall District.

	Thickness. Feet.	Total. Feet.	
New River Group (440′)			
Sandstone, **Lower Nuttall**, grayish-white, pebbly, making cliff	55	55	
Concealed	60	115	
Shale, buff	5	120	
Slate, black, plant fossils	10	130	130′
Concealed and shale	5	135	
Sandstone, grayish-white, massive, making cliff, **Harvey Conglomerate**	50	185	
Concealed	9	194	
Coal blossom, Castle	1	195	65′
Shale and sandstone	25	220	
Concealed in steep slope, mostly sandstone	20	240	
Concealed in gentle slope	35	275	
Sandstone, soft, brown, **Lower Guyandot**	21.8	296.8	
Coal, soft 2′ 7″ **Coal** and slate mixed 0 7 } **Sewell (2075′ B.)**	3.2	300	105′
Fire clay shale and buff, sandy shale	10	310	
Sandstone, shaly and flaggy	15	325	
Concealed	20	345	45′
Sandstone, Upper Raleigh, grayish-white, visible	35	380	
Concealed to road fork at Winona	60	440	95′

In the southwest corner of Nuttall District the author measured the following section with aneroid from the top of the great Lower Nuttall Sandstone cliff down the northeast hillside of New River via **Mine No. 109 on Map II** in the Sewell Coal, mostly along the hill road leading from Edmond to Nuttallburg. That portion above the Sewell Coal represents almost vertical measurements, as the results were determined from exposures directly above the opening:

Nuttallburg Section, Nuttall District.

	Thickness. Feet.	Total. Feet.	
New River and Pocahontas Groups (986′)			
Sandstone, Lower Nuttall, massive, conglomeratic, quartzitic, grayish-white, making cliff	100	100	100′
Concealed, mostly shale	105	205	
Sandstone, **Harvey**, current-bedded, medium-grained, grayish-white, hard, making cliff, somewhat flaggy	65	270	
Shale, brown and dark, sandy	45	315	
Sandstone	5	320	
Shale and concealed	15	335	
Sandstone, Guyandot	21	356	
Shale, dark, argillaceous	2.9	358.9	
Coal (1″) Sewell "B"	0.1	359	259′
Shale, dark	6	365	
Sandstone, platy, shaly top, **Lower Guyandot**	24.2	389.2	
Bony cannel 0′ 6″ Slate, black, cannelly 1 11 Bony cannel 0 7 **Coal**, soft 2 9 **Sewell Coal**, (Mine 109 on Map II) (1560′ L.)	5.8	395	36′
Shale	5	400	
Sandstone, **Welch**, broken, current-bedded, making cliff	30	430	
Shale, buff, sandy	15	445	
Concealed	12	457	
Slate, black, iron ore nodules	3	460	
Concealed	30	490	
Shale	5	495	100′
Sandstone, Upper Raleigh, grayish-white, pebbly, making great cliffs	50	545	
Shale, green and buff, sandy, iron ore nodules	10	555	
Sandstone, Lower Raleigh, grayish-white, current-bedded	35	590	
Concealed and shale	14.5	604.5	
Coal blossom (6″) Beckley	0.5	605	110′
Concealed in bench at extreme west bend in road	15	620	

	Thickness. Feet.	Total Feet	
Sandstone, **Quinnimont**, massive, quartzitic, grayish-white, making cliff	35	655	
Concealed	15	670	
Shale, sandy, dark top	20	690	
Concealed	70	760	
Sandstone, grayish-white	10	770	
Concealed	55	825	
Sandstone, medium-grained, current-bedded	30	855	
Shale, sandy	5	860	
Concealed to C. & O. Railroad grade at Nuttall Station (954′ L.)	126	986	381′

SPECIAL SECTIONS, FAYETTEVILLE DISTRICT.

In Fayetteville District the surface rocks belong mostly in the New River Group, although a large area of the Kanawha division of the Pottsville Series is represented in the western half and a narrow belt of the Mauch Chunk Series is exposed low down along the west valley wall of New River above Thurmond. In the northern point of the District the following section was measured with aneroid by the author from near the second-class road fork, 0.6 mile southwest of Cotton Hill, northeastward mostly along the hill road to the bed of New River at the mouth of Laurel Creek. The heavy Guyandot Sandstone has locally cut away the Sewell Coal:

Cotton Hill Section, Fayetteville District.

	Thickness. Feet.	Total. Feet.
New River Group (500′)		
Sandstone, **Upper Nuttall**	125	125
Concealed to road fork	15	140
Sandstone, **Lower Nuttall**, grayish-white, conglomeratic	70	210
Concealed, mostly shale	10	220
Sandstone, broken	15	235
Sandstone, and shale, dark, and shale, sandy	55	290
Sandstone, platy	30	320
Concealed, mostly sandy shale	55	375
Sandstone, **Guyandot**, conglomeratic (835′B.)	50	425
Shale, dark	15	440
Shale, sandy, flaggy	20	460
Sandstone, **Upper Raleigh**, grayish-white, conglomeratic, to bed of New River at Cotton Hill	40	500

The following section was measured with hand-level by the author on the southwest hillside of New River along the hill road leading from South Fayette Station on the Chesapeake and Ohio Railway to Fayetteville. The results represent almost vertical determinations, since the measurements were made on exposures almost on the strike of the strata:

South Fayette Station Section, Fayetteville District.

	Thickness. Feet.	Total. Feet.	
New River and Pocahontas Groups (992')			
Concealed from summit of mountain road	14	14	
Sandstone, Upper Nuttall, current-bedded, slightly friable	88	102	
Concealed, mostly shale	10	112	
Sandstone, Lower Nuttall, massive, quartzitic, conglomeratic, making great cliff	88.5	200.5	
Coal, Hughes Ferry, soft (1623' L.)	0.5	201	201'
Shale, bluish-gray and laminated top and dark, slightly siliceous bottom	62	263	
Concealed	9	272	
Shale, buff, sandy	13	285	
Shale, black, plant fossils abundant	2	287	
Coal, gas, medium-soft, Lower Iaeger? (1536' L.)	1	288	87'
Sandstone, Harvey, current-bedded, medium-grained, grayish-white	62	350	
Coal, soft, 3" of top slaty, Castle (1474' L.)	0.5	350.5	62.5'
Shale	1.5	352	
Sandstone	8	360	
Shale, argillaceous, bluish-black to gray	9	369	
Sandstone, current-bedded, medium-grained 37' Concealed 20 Sandstone, current-bedded 21 **Guyandot**	78	447	
Sandstone, flaggy and slaty	29	476	
Shale, Hartridge, buff, argillaceous, Lingula fossils, not abundant	5.7	481.7	
Coal, Sewell, edge of road at road fork leading **to Mine No. 120 on Map II (1341' L.)**	3.3	485	134.5'
Fire clay shale	9	494	
Sandstone, flaggy and shaly	5	499	
Shale, laminated, dark-brown	29	528	
Sandstone, Welch	8	536	
Shale, gray	1	537	
Coal, slaty 1' 0" Shale, argillaceous 6 0 **Coal, slaty** 0 5 **Welch** (1281' L.)	7.5	544.5	59.5'
Shale, sandy	5.5	550	
Sandstone, Upper Raleigh, current-bedded, grayish-white, medium-grained	28	578	
Concealed	30	608	

	Thickness. Feet.	Total. Feet.	
Coal (3") Little Raleigh, (1217′ L.)......	1	609	64.5′
Concealed	46	655	
Sandstone, Lower Raleigh, massive, grayish-white and brown, quartzitic, iron ore nodules abundant in basal foot..........	77	732	
Shale, bluish-black, sandy................	14	746	
Coal and slate mixed, Beckley, Calamite plants abundant (1080′ L.)..............	2	748	139′
Sandstone	4	752	
Shale, sandy, brownish-gray..............	16	768	
Sandstone	5	773	
Shale, sandy, greenish, with dark layers..	21	794	
Shale, dark, argillaceous, plant fossils abundant	3	797	
Coal and slate mixed, Fire Creek (1029′ L.)	0.7	797.7	49.7′
Shale, green, sandy.......................	4.3	802	
Sandstone, Pineville, broken, medium-grained, quartzitic, making great cliff...	102	904	
Shale, greenish-gray, sandy................	5	909	
Slate, bluish-black........................	2.5	911.5	
Slate, black, cannelly, (5") with Lingula, probably **Royal Shale** horizon...........	0.5	912	114.3′
Shale, sandy, to C. & O. R. R. grade South Fayette (909′ L.).......................	6	918	
Shale, sandy, to well mouth (27 on Map II)	13	931	
(Continued—Water Well No. 27 on Map II):			
Unrecorded in well.......................	55	986	
Coal, No. 3 Pocahontas (reported 6′ thick by G. W. Atkinson, a coal miner).......	6	992	80′

The following succession of the strata is obtained by combining a section measured with aneroid by the author from **Opening No. 412 on Map II** in the Little Eagle Coal, 0.9 mile west of the road crossing of Marr Branch, southeastward along the private road, with the log of a Hawkins Land Co. Diamond Drill Boring—No. 29 on Map II, the details of which were furnished by C. E. Krebs, formerly of the State Survey Staff. In that portion above the top of the boring the intervals are less than they should be, owing to a southeast rise of 40 to 50 feet in the strata between the Little Eagle Coal opening and the boring in question. **The Eagle Limestone and Shale** should belong in the concealed interval 46 feet below the top, as southward along the east side of this ridge to the Raleigh County Line this marine fossiliferous zone belongs directly over the first heavy, massive, coarse, brown and friable sandstone ledge (Lower War Eagle) below the Little Eagle

Coal and at an interval of 75 to 90 feet below the latter bed. The coal at the opening in question has the same character and bed section as at the old Beechwood Mine of the Stuart Colliery Co.—No. 93 on Map II—4.7 miles southwestward, near Parral, details of which are given on a subsequent page in Chapter XI, so that there is no doubt as to the correlations of the upper members of the section:

Fayetteville—1.5 Miles Northwest Section, Fayetteville District.

	Thickness.		Total.		
	Ft.	In.	Ft.	In.	
Kanawha Group (407′ 3″)					
Sandstone, **Decota**, current-bedded, coarse, brown, micaceous..	3	4	3	4	
Coal, gas, medium-soft .... 4″ to 0′ 5″ **Slate, black**, siliceous 2 to 0 3 **Coal**, soft, columnar .....22 to 2 0 Opening No. 412 on Map II .... **Little Eagle** (2015′ B.)	2	8	6	0	6′
Fire clay shale, grayish-white....	2	0	8	0	
Concealed	28	0	36	0	
Shale, buff, sandy................	10	0	46	0	
Concealed (holding Eagle Limestone and Shale)...............	25	0	71	0	65′
Sandstone, Lower War Eagle, coarse, friable, brown, micaceous	50	0	121	0	
Concealed	34	0	155	0	
Coal blossom, Lower War Eagle..	1	0	156	0	85′
Concealed	30	0	186	0	
Shale, buff, sandy................	55	0	241	0	
Concealed and shale in bench....	20	0	261	0	105′
Sandstone, Dotson, massive, coarse, brown, friable..................	42	0	306	0	
Concealed	25	0	331	0	
Coal blossom, Douglas...........	0	0	331	0	70′
Shale, fire clay..................	5	0	336	0	
Concealed to top of boring.......	24	0	360	0	29′
(Continued with log of Coal Test Boring No. 29 on Map II) (Elevation, 1650′ B.)					
Surface	8	4	368	4	
Slate	11	11	380	3	
Sandstone	7	9	388	0	
Coal, bony....................	0	6	388	6	28′ 6″
Shale, Douglas..................	14	0	402	6	

				Thickness.		Total.		
				Ft.	In.	Ft.	In.	
Slate with seam of **coal, Lower Douglas**				2	2	404	8	
Soapstone				2	7	407	3	18′ 9″
New River Group (479′7″)								
Sandstone, gray	53′	6 ″						
Slate, sandy....	4	5½						
Sandstone, gray	1	8						
Sandstone, gray, seams of **coal** and **fire clay**	11	3	**Upper Nuttall**	109	1½	516	4½	
Sandstone, gray	38	3						
Slate				8	0	524	4½	
Fire clay........................				3	9	528	1½	
Sandstone, gray, **Lower Nuttall**..				121	3½	649	5	242′ 2″
Slate, seams of sandstone........				10	10½	660	3½	
Slate				11	1½	671	5	
Slate, with seams of **coal, Lower Iaeger?**				10	6	681	11	
Slate, with seams of sandstone...				29	10	711	9	
Sandstone, gray, **Harvey Conglomerate**				47	8	759	5	
Slate				15	9	775	2	
Sandstone				1	11	777	1	
Slate				4	2	781	3	131′ 10″
Sandstone, gray	20′	2½″						
Slate and seams of coal.......	11	3						
Sandstone, gray	6	11	**Guyandot..**	60	1	841	4	
Slate	16	5½						
Slate and sandstone	5	3						
Coal, Sewell "B".................				0	2	841	6	60′ 3″
Fire clay........................				2	8	844	2	
Slate				16	2	860	4	
Slate and sandstone				11	3	871	7	
Slate				7	0	878	7	
Coal, Sewell, (1127′ B.)...........				4	3	882	10	41′ 4″
Slate to bottom..................				4	0	886	10	4′ 0″

The following section, measured with aneroid by the author on the west side of the same ridge from the trail knob summit, 0.6 mile southwest of Coal Test Boring No. 29 on Map II, northward along the trail leading down Sugar Creek, corroborates the correlations in the upper portion of the section last given. The intervals are excessive, owing to the northwest dip of the strata:

Sugar Creek of Laurel Section, Fayetteville District.

	Thickness. Feet.	Total. Feet.	
Kanawha Group (633')			
Concealed from trail summit	30	30	
Sandstone	35	65	
Concealed	99	164	
Coal blossom, heavy, Eagle, (2065' B.) (**Opening No. 394 on Map II**), visible	1	165	165'
Sandstone, **Decota**	15	180	
Concealed	15	195	
Sandstone	6	201	
Shale, sandy	1.5	202.5	
Coal, gas, medium-soft 0' 7" Bone 0 1 **Coal**, soft 1 10 **Little Eagle Coal** (2015' B.) (**No. 413 on Map II**)	2.5	205	40'
Slate, concealed, and black slate, **Eagle**	100	305	100'
Sandstone, coarse, brown, Lower War Eagle	40	345	
Concealed	10	355	
Shale, buff, sandy	45	400	
Sandstone	5	405	
Concealed, mostly buff shale	25	430	125'
Shale, buff, sandy	5	435	
Sandstone, Dotson, coarse, friable, brown	63	498	
Shale, buff	10	508	78'
Fire clay and shale, buff, sandy	15	523	
Sandstone	15	538	
Concealed	25	563	
Shale, siliceous, buff, dark, laminated	45	608	
Concealed and shale to **base Kanawha Group** and top of **Upper Nuttall Sandstone** (1490')	25	633	125'

Four miles southward in the same District (Fayetteville), the following succession of the strata is obtained by combining a section measured with aneroid by the author, southwestward from the summit of a high knob to the old Beechwood Mine—No. 93 on Map II—and thence southeastward mostly along trail to the top of the Hawkins Land Co. Coal Test Boring No. 9—No. 38 on Map II—the details of which were furnished the Survey by C. E. Krebs of Charleston:

Parral (Summerlee) Section, Fayetteville District.

	Thickness.		Total.		
	Ft.	In.	Ft.	In.	
Kanawha Group (610′1″)					
Sandstone and shale, and concealed from summit of knob, 1 mile northwest of Stuart	127	0	127	0	
Sandstone, Eagle, visible	10	0	137	0	
Coal, Eagle, at closed prospect, several thick partings	13	0	150	0	150′ 0″
Slate and concealed	32	0	182	0	
Sandstone, **Decota, visible**	4	5	186	5	
Coal, medium-soft .. 0′ 2½″ **Coal,** slightly bony... **0 1** **Coal,** medium-soft .. 0 6½ Bony black slate .... 0 1 **Coal,** soft, columnar. 2 8 (Mine No. 93 on Map II) **Little Eagle.** (2325′ B.)	3	7	190	0	40′ 0″
Shale, buff, sandy	65	0	255	0	
Concealed	9	0	264	0	
Shale, buff	2	6	266	6	
Sandstone, yellowish-gray, marine fossils abundant ..... 0′ 6″ Slate, gray...... 0 3 Slate, black..... 5 0 **Eagle Limestone** and **Shale** (2245′ B.)	8	6	275	0	85′ 0″
Coal, Little Cedar	0	3	275	3	
Concealed, shale and fire clay	4	9	280	0	
Sandstone, coarse, brown, friable, **Lower War Eagle**	30	0	310	0	
Concealed and fire clay	5	0	315	0	
Shale, buff and sandy	15	0	330	0	
Concealed	25	0	355	0	80′ 0″
Sandstone, coarse, brown, friable, **Upper Gilbert**	50	0	405	0	
Concealed to top of Boring No. 38 on Map II	55	0	460	0	105′ 0″
(Continued with log of Hawkins Land Co. No. 9 Boring—No. 38 on Map II)					
Surface debris	8	10	468	10	
Sandstone, **Dotson**	13	4	482	2	
Slate	24	4	506	6	
Coal, Douglas	0	1	506	7	46′ 7″
Slate	1	8	508	3	

		Thickness. Ft.	In.	Total. Ft.	In.	
Sandstone .. 19′ 1½″ Slate .... 2 6½ Sandstone, gray ...... 3 8½ Slate .... 0 5½ Sandstone, gray, seams of slate.... 28 2½	**Lower Dotson Sandstone**	54	0½	562	3½	
Slate		47	9½	610	1	103′ 6″
New River Group (553′ 2½″)						
Sandstone . 70′ 1½″ Slate .... 1 11½ Sandstone .. 1 10½ Slate .... 2 11½ Sandstone, gray ...... 17 7½ Slate .... 0 7½ Sandstone, gray 40 3½	**Upper Nuttall Sandstone**	135	5½	745	6½	
Slate		2	6½	748	1	
Fire clay		1	4½	749	5½	
Slate		3	2½	752	8	
Sandstone, Lower Nuttall		90	8½	843	4½	233′ 3½″
Slate and sandstone		5	6	848	10½	
Slate		2	3	851	1½	
Slate and sandstone		3	4½	854	6	
Sandstone, gray, Middle Iaeger?		52	3½	906	9½	
Slate		26	10½	933	8	
Coal, Lower Iaeger ?		0	6½	934	2½	90′ 10″
Slate and sandstone		27	6½	961	9	
Sandstone, Harvey Conglomerate		52	2½	1013	11½	
Slate and sandstone		15	5½	1029	5	95′ 2½″
Fire clay, horizon of **Castle Coal** at top		5	0½	1034	5½	
Slate		9	5½	1043	11	
Slate and sandstone, **Guyandot**		10	11	1054	10	
Slate		10	8½	1065	6½	
Coal, Sewell "B"		0	8½	1066	3	36′ 10″
Slate and sandstone		10	11½	1077	2½	
Slate		0	7½	1077	10	
Sandstone, gray		3	8½	1081	6½	
Slate		1	11½	1083	6	
Sandstone, gray		0	8½	1084	2½	
Slate		2	7½	1086	10	
Sandstone, gray		17	4½	1104	2½	
Slate and sandstone		18	8½	1122	11	
Slate		1	0½	1123	11½	
Coal, Sewell "A"		0	10½	1124	10	58′ 7″
Slate		1	0	1125	10	
Sandstone, dark		5	8½	1131	6½	
Sandstone, gray		8	7½	1140	2	
Slate		10	3½	1150	5½	
Coal, Sewell		4	1	1154	6½	29′ 8½″
Slate to bottom of hole		8	9	1163	3½	8′ 9″

Compensating for the northwest dip of the strata, the boring used in the above section should start about 430 feet below the Little Eagle Coal, a figure that was used for the Parral region in the Table of Intervals for the No. 2 Gas Coal bed in Chapter III, pages 88-89. The section is very important, in that the presence of the marine fossiliferous **Eagle Limestone and Shale,** 85 feet below the coal at the old Beechwood Mine and 125 feet below the Eagle Coal, establishes the correlation of the one mined at No. 93 on Map II as the Little Eagle seam. It also shows a degree of development for that portion of the Kanawha Group represented closely approaching the maximum for these measures in Mingo and McDowell Counties, as also the true position of the **Dotson** and **Lower Dotson Sandstones** of the latter area.

One mile and a half southwestward in the same District the author measured the following section along the hill road on the east side of Loop Creek, 0.6 mile northwest of Bishop station on the Virginian Railroad:

Bishop—0.6 Mile Northwest Section, Fayetteville District.

Kanawha Group (237′)	Thickness. Feet.	Total. Feet.	
Sandstone, Lower War Eagle, coarse, brown, concretionary	25	25	
Concealed, mostly brown shale	15	40	
Shale, black, buff and sandy	15	55	
Concealed	5	60	60′
Sandstone, Upper Gilbert, coarse, brown, friable, iron ore bands	30	90	
Concealed	5	95	
Shale, buff, brown and black, interlaminated	55	150	90′
Sandstone, Dotson, coarse, brown, and shale	33	183	
Coal blossom, Douglas (1875′ B.)	2	185	35′
Sandstone .... 10′ Concealed .... 20 } **Lower Dotson**.... Sandstone 18.2	48.2	233.2	
Coal .... 0′ 6″ } **Lower Douglas** Slate, gray.... 0 1½ } (1825′ B.) ...... **Coal** 0 1	0.8	234	49′
Slate, black	3	237	
New River Group (57′)			
Sandstone, Upper Nuttall, to road fork	57	294	60′

The following succession of the strata is obtained by combining a section measured with aneroid by the author from the summit of the high knob, 1 mile S. 60° W. of Carlisle, northeastward to the road summit at the low gap on head of Righthand Fork of Mossy Creek, and thence eastward along the hill road to the top of Carlisle Shaft—Mine No. 158 on Map II—with a partial log of the shaft. The strata are so nearly horizontal between the summit of the knob and the shaft that the measurements represent practically vertical determinations. The interval for the Sewell Coal below the top of the New River Group is much increased over that prevailing in the Ansted—Hawks Nest region of Fayette County, but is in closer agreement with the results obtained in the Parral Section, published on a preceding page:

Carlisle Section, Fayetteville District.

	Thickness. Feet.	Total. Feet.	
Kanawha Group (600′)			
Concealed in steep slope from summit of knob	110	110	
Concealed in bench with fragment of black slate, **Eagle**	25	135	135′
Sandstone, medium-grained, grayish-brown.	25	160	
Concealed in bench	5	165	
Concealed, mostly sandstone, brown, hard, and shale, argillaceous	97	262	
Coal, Glanalum Tunnel, at M. P. Maloney opening, closed, reported	3	265	130′
Concealed	30	295	
Concealed, mostly buff, sandy shale	100	395	130′
Sandstone, coarse, friable, brown, **Lower Gilbert**	35	430	
Concealed	5	435	
Shale, black, Gilbert	10	445	
Concealed to road fork	15	460	65′
Sandstone, coarse, brown, friable, Dotson	40	500	
Shale, dark, sandy	5	505	
Concealed	5	510	
Shale, dark. buff, sandy	30	540	
Concealed	15	555	95′
Sandstone, Lower Dotson, coarse, brown, friable	30	585	
Fire clay and concealed	10	595	
Shale	5	600	45′

New River Group (529′)	Thickness. Feet.	Total. Feet.	
Sandstone, coarse, brown, friable.... 60′ Concealed .... 5 Sandstone, coarse, brown .... 20 Upper Nuttall....	85	685	85′
Top Carlisle Shaft—Mine 158 on Map II (Elevation top of shaft, 1790′ B.)			
Interval in shaft........................	440	1125	
Coal, Sewell (1350′ B.).....................	4	1129	444′

In the extreme southwest edge of Fayetteville District, the author measured with aneroid the following section from the summit of Potato Hill Knob, 2½ miles northwest of Herberton, the section being made up from observations on exposures on the north, northeast, east and southeast slopes of the knob and including the coals mined at Openings 55, 89, and 94 on Map II, in the No. 2 Gas, Eagle, and Glenalum Tunnel Coals, respectively:

Potato Hill Knob Section, Fayetteville District.

Kanawha Group (1500′)	Thickness. Feet.	Total. Feet.	
Sandstone, flaggy, from summit of Potato Hill Knob	13.5	13.5	
Coal, Stockton?, slaty (3105′ B.)...........	1.5	15	15′
Sandstone, Upper Coalburg, current-bedded, coarse, making cliff....................	50	65	
Coal, Coalburg, not well exposed..........	5	70	55′
Sandstone, current-bedded, coarse, brown, making cliff..........................	40	110	
Concealed	5	115	
Coal, blossom, Little Coalburg (3055′B.)...	5	120	50′
Shale, fire clay, sandy....................	5	125	
Sandstone	10	135	
Coal, blossom, Buffalo Creek?............	5	140	20′
Concealed and shale.....................	5	145	
Sandstone, coarse, brown, Upper Winifrede	35	180	
Concealed, with coal blossom, Winifrede...	15	195	55′
Sandstone, Lower Winifrede.............	40	235	
Concealed in bench......................	10	245	
Sandstone, platy, Lower Winifrede........	40	285	
Shale, dark, argillaceous, almost mass of marine fossils, many species, Winifrede or Indian Gap Limestone horizon........	10	295	100′
Sandstone, coarse at bottom, platy at top, brown, Upper Chilton..................	85	380	
Coal, gas, hard 1′ 6″ Bone .... 0 6 Coal, gas, hard 1 6 (Prospect closed, section by Wm. Bailey) (No. 279 on Map II) Chilton (2780′ B.)....	5	385	90′

	Thickness. Feet.	Total. Feet.	
Shale and concealed	39	424	
Coal, Hernshaw? at closed prospect, (reported 6 feet, with partings)	6	430	45′
Concealed and sandstone	106	536	
Coal, soft... 0′ 6″ Bony **coal** and slate.. 0 1½ **Coal, medium-**hard ...... 3 8½ } **Cedar Grove** (No. 284 on Map II) (4′ 3″)	4	540	110′
Slate and concealed	130	670	
Coal blossom, heavy, Alma, in old tree grove	5	675	135′
Slate and concealed	67	742	
Coal, Peerless, at closed prospect, reported 3 feet thick, clean and hard, by Wm. Bailey	3	745	70′
Concealed	3.3	748.3	
Shale, buff, and black, argillaceous	15	763.3	
Coal, soft, columnar 1′ 8″ Slate, dark-gray.... 0 1 **Coal,** soft, columnar 0 6 **Coal,** medium-hard, columnar .... 2 0 **Coal,** soft, columnar 1 7 Shale, gray......... 0 6 **Coal,** soft, columnar 0 4 } (2440′ B.) **No. 2 Gas (Mine 55 on Map II)** Long Branch Coal Company	6.7	770	25′
Slate, concealed, and sandy shale	58.7	828.7	
Coal, soft, columnar 1′ 9″ Shale, gray, sandy.. 1 6 **Coal,** soft, columnar 2 10 Slate, gray......... 0 1 **Coal** .... 0 2 } **Prospect No. 358 on Map II) Powellton** (6′ 4″)	6.3	835	65′
Slate and concealed	94.5	929.5	
Sandstone	25	954.5	
Coal, soft.. 0′ 7″ Slate, black 1 6 **Coal,** slaty.. 1 2 } **Eagle "Rider"**	3.2	957.7	
Shale, buff, sandy, with iron ore nodules	8	965.7	
Coal, soft, columnar 1′ 10″ Shale, gray, 2″ to... 0 4 **Coal,** soft, columnar 2 1 } **Eagle, (Mine 89 on Map II)** (4′ 3″)	4.3	970	135′
Slate and concealed	45	1015	
Sandstone, shaly and flaggy, and shale, brown and sandy	50	1065	
Shale, black, Eagle, marine fossils	10	1075	105′
Fire clay shale, **Little Cedar Coal horizon**	1	1076	
Shale, dark, sandy	19	1095	
Sandstone, coarse, brown, Lower War Eagle	50	1145	
Concealed	50	1195	
Sandstone, coarse, brown, Upper Gilbert	30	1225	
Concealed	16.7	1241.7	
Shale, visible	1	1242.7	
Coal, soft, columnar, Glenalum Tunnel (Opening 94 on Map II)	2.3	1245	170′
Concealed	55	1300	

	Thickness. Feet.	Total. Feet.	
Shale, buff	4	1304	
Coal, (10″) Gilbert	1	1305	60′
Slate	5	1310	
Sandstone, **Dotson**	20	1330	
Concealed	170	1500	195′
New River Group (460′)			
Sandstone, **Upper Nuttall**, and concealed	100	1600	
Sandstone, **Lower Nuttall**	100	1700	
Interval to **Sewell Coal**, estimated	260	1960	460′

In the above, the intervals in that portion below the Eagle Shale are less than they should be, owing to the southeastward rise of the strata. The section is very important in that **two marine fossil horizons—Winifrede Limestone and Eagle Shale**—are shown, the former apparently belonging directly over the Upper Chilton Sandstone, instead of at the base, as heretofore tentatively placed. In conjunction with the section given below for Herberton, it also demonstrates the fact that the bed operated by the Long Branch Coal Company and the Willis Branch Coal Company at **Mines Nos. 55 and 56 on Map II,** respectively, correlates with the **No. 2 Gas Coal** instead of the **Alma** as given by Krebs in the Detailed Geological Report of Raleigh County, page 409. The latter coal belongs 85 to 100 feet higher in the measures as also shown in the following revised section for the Herberton region over that given by Krebs in the last-mentioned Report, pages 66-8. This section was measured with aneroid from the summit of the high knob, 1.5 miles west of Herberton on the Raleigh-Fayette County Line northward to the base of an opening in the No. 2 Gas Coal, projected from Mine No. 56 on Map II. That portion below this bed was measured from the main opening farther east largely with hand-level eastward from the latter mine mostly along the incline to a connection with the top of Coal Test Boring No. 62 on Map II, located slightly less than 200 feet S. 25° W. from the top of the Weirwood Shaft Mine—No. 174 on Map II. Of that portion of the Kanawha Group present, the section shows a development only about 300 feet less in thickness than the maximum represented in the State in the Counties of Mingo and McDowell. In that portion between the base of the No. 2 Gas Coal and the top of the Upper Nuttall Sandstone, the intervals are slightly less than

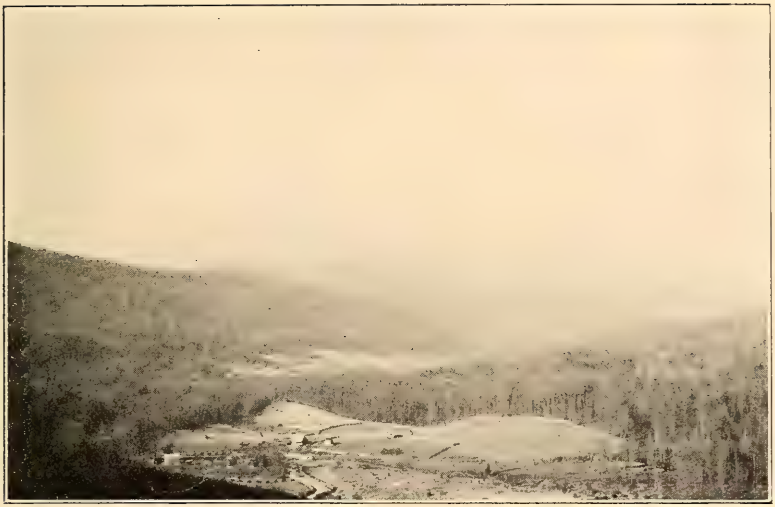

PLATE VII(a).—Looking due north across the valley of Sewell Creek at Myles Knob of Sewell Mountain on sky-line, showing topography of New River and Pocahontas Groups and Mauch Chunk Series, the cultivated fields being in the latter.

PLATE VII(b).—Looking northward at Sims Mountain, just south of Rainelle, showing fine farm surrounded by forests.

they should be, owing to an eastern rise of the strata of about 40 feet between the exposures of these members. The "Kidd" seam, erroneously correlated as the Lower War Eagle on page 342 of Volume II(A) of the State Survey Reports, belongs about 280 feet lower in the measures and represents the **Douglas Coal** of McDowell County. This section, as also those for Potato Hill Knob and Parral, published on preceding pages, shows that the **Dotson** and **Lower Dotson Sandstones** and the **Douglas** and **Lower Douglas Coals** belong in the Kanawha Group instead of the New River division of the Pottsville Series:

Herberton (Willis Branch) Section, Fayetteville District.

	Ft.	In.		Thickness. Feet.	Total. Feet.	
Kanawha Group (1212′)						
Sandstone, shale, concealed, and sandstone from top of knob at southwest point of Fayetteville District				203.7	203.7	
Sandstone, Peerless				6	209.7	
Coal, soft, columnar	0′	6″	**Alma** (2765′ B.) (Prospect No. 293 on Map II)	6.3	216	216′
Shale, gray	0	6				
Coal, slaty	0	2				
Shale, gray	0	2				
Coal, soft, 2″ to	0	3				
Shale, gray	0	3				
Coal, soft	0	2				
Coal and slate mixed	0	3				
Coal, soft, columnar	2	0				
Coal, soft, with thin slate streaks	2	0				
Slate and concealed				41.5	257.5	
Shale, buff, sandy				2	259.5	
Coal, medium-hard, gas, Peerless (2′ 9″)				2.8	262.3	46.3′
Slate and concealed				16	278.3	
Shale, argillaceous				15	293.3	
Coal, soft, columnar	0′	7″	(2676′ L.) **No. 2 Gas** (Mine 56 on Map II) (6′ 8″)	6.7	300	37.7′
Slate, dark, lenticular, 0″ to	0	0½				
Coal, soft, columnar	0	10½				
Slate, dark-gray, ½″ to	0	1				
Coal, soft, columnar, 2″ to	0	3				
Slate, dark-gray	0	2				
Coal, soft, columnar	4	0				
Slate, gray, 1″ to	0	2				
Coal, soft, columnar, 4″ to	0	6				
Slate and concealed				26.8	326.8	
Coal, Lower Campbell Creek, at closed prospect, reported 39″ thick and clean, by Thos. Laing				3.2	330	30′

		Thickness. Feet.	Total. Feet.	
Slate and concealed, mostly sandstone, **Brownstown**		46.7	376.7	
Sandstone, flaggy		3	379.7	
Coal, soft, columnar 0′ 2½″				
Slate, black, bony, 2″ to 0 2½				
Coal, soft, columnar 1 3	(Prospect No. 359 on Map II) (5′ 3″) **Powellton** (2595′ B.)	5.3	385	55′
Shale, gray, argillaceous, with **coal** streaks at base 1 2				
Coal, soft, columnar 2 5				
Slate and concealed		15	400	
Sandstone		55	455	
Shale, sandy		4.8	459.8	
Coal, (2″) **Matewan**		0.2	460	75′
Sandstone, massive, coarse-grained, **Matewan and Eagle**		84.6	544.6	
Shale, dark, sandy, **Calamite** and other plant fossils abundant		2	546.6	
Coal, soft, columnar 1′ 6″				
"Mother" coal 0 1	(Mine No. 90 on Map II) **Eagle** (3′ 5″) (2476′ L.)	3.4	550	90′
Coal, soft, columnar 1 10				
Shale, sandy and concealed		54	604	
Sandstone and sandy shale, dark, laminated		81	685	
Shale, dark 13′				
Shale, sandy 1				
Limestone, dark, marine fossils abundant 1	**Eagle Limestone and Shale**	34	719	169′
Shale, dark 19				
Fire clay shale, soft, dark-gray		3	722	
Shale, sandy		30	752	
Coal, Little Cedar, medium-hard, "peacock" lustre		2	754	35′
Fire clay shale		3	757	
Shale, sandy		33.4	790.4	
Shale, dark		2	792.4	
Shale, black, cannelly, **Lingula** fossil shells abundant		1.5	793.9	
Coal, soft, columnar 1′ 2″				
Shale, gray 0 5				
Coal, medium-soft, columnar 1 6	**Lower War Eagle** (at Prospect) (3′ 1″)	3.1	797	43′
Fire clay shale		1	798	
Sandstone, **Upper Gilbert**		59	857	
Shale, sandy		1.6	858.6	
Coal, soft, columnar, Glenalum Tunnel (Opening No. 95 on Map II)		3.4	862	65′
Sandstone, Lower Gilbert		25	887	
Shale, buff, sandy		49.8	936.8	
Coal, 2″		0.2	937	
Shale, buff, sandy		35	972	
Coal, soft, Gilbert "A" (15″) to		1	973	
Sandstone, green, micaceous		20	993	
Coal, Gilbert		1	994	132′
Fire clay shale		1	995	

	Thickness. Feet.	Total Feet.	
Sandstone, massive, fine-grained, **Dotson**	14	1009	
Shale, sandy and concealed	53	1062	
Shale, buff, sandy and flaggy	7.5	1069.5	
Slate, dark, **Lingula fossil shells abundant**	3	1072.5	
Shale, black, cannelly	0.5	1073	
Coal, soft, columnar 2′ 6″ **Coal**, slaty 0 6 } **Douglas, "Kidd"** (at Opening No. 98 on Map II)	3	1076	82′
Fire clay shale	1	1077	
Shale, sandy and concealed	135	1212	136′
New River Group (509.2′)			
Sandstone, Upper Nuttall, "Panther" of McDowell County, and concealed	100	1312	
Sandstone, Lower Nuttall, to top boring No. 62 on Map II	40	1352	
(Continued with log of Coal Test Boring 62 on Map II) (1676′ L.)			
Surface debris	13	1365	
Sandstone, **Lower Nuttall**	42	1407	195′
Slate	17	1424	
Sandstone, Harvey Conglomerate	32	1456	
Shale, dark	3	1459	
Sandstone	2	1461	
Shale, dark	46	1507	
Sandstone, very hard, **Guyandot**	78	1585	
Shale	22	1607	
Coal, bony, Sewell "B"	0.5	1607.5	200.5′
Shale	15.5	1623	
Sandstone	17	1640	
Shale	9	1649	
Coal, Sewell "A"	0.3	1649.3	41.8′
Fire clay	1.5	1650.8	
Sandstone	3.2	1654	
Shale, with sandstone partings	40	1694	
Shale, dark	19	1713	
Bone, streaked with **coal** 1′ 0″ **Coal**, bony 0 1½ **Coal** 1 1 **Coal**, bony 0 7 **Coal** 0 8 **Coal**, (core lost) 1 5 } (Near Mine 174 on Map II) **Sewell (4′ 10½″)**	4.9	1717.9	68.6′
Fire clay to bottom of hole	3.3	1721.2	3.3′

SPECIAL SECTIONS, SEWELL MOUNTAIN DISTRICT.

Sewell Mountain District lies on the east side of New River from Fayetteville District, and, like the latter area, the surface rocks belong mostly in the New River and Pocahontas divisions of the Pottsville Series, although some of the highest knobs and ridges along the northwest border are capped with basal members of the Kanawha Group. In the western edge the upper beds of the Mauch Chunk Series rise above drainage low down in the gorge of New River southward from the mouth of Manns Creek to near Beury, and in the eastern edge of the District low down on the valley walls of Sewell Creek northeastward from Sievy Bridge and on Wolfpen Creek westward from Rainelle. Several sections will now be given successively southward along the gorge of New River, the first below having been measured with aneroid by the author southwestward via **Mines Nos. 112 and 113 on Map II** in the Sewell Coal, mostly along the hill road to the bed of New River at the mouth of Manns Creek. The intervals are excessive owing to a dip of about 100 feet in the strata between the top and bottom exposures of the section:

Manns Creek—Mouth of—Section, Sewell Mountain District.

	Thickness. Feet.	Total. Feet.	
New River Group (730′)			
Concealed from road summit	40	40	40′
Sandstone, Guyandot	75	115	
Concealed	79	194	
Shale	1.5	195.5	
Coal, Sewell, (at Mine No. 112 on Map II) (1855′ B.)	4.5	200	160′
Slate, gray, and concealed, mostly sandy shale	40	240	
Sandstone, Upper Raleigh, making great cliff	65	305	
Concealed and dark, laminated shale	90	395	
Sandstone, **Quinnimont,** massive, making cliff, with iron ore nodules and **coal** spars	35	430	
Shale, brown and black, laminated, pencil.... 15′ Concealed .... 5 Shale, brown and black mixed, laminated, pencil .... 35 } **Quinnimont** ...	55	485	
Concealed	5	490	
Shale, buff	4.7	494.7	
Coal, slaty	0.3	495	
Shale, buff	5	500	
Concealed	5	505	
Coal, blossom, Fire Creek (1555′ B.)	..	505	305′
Shale, buff, sandy	35	540	
Concealed	15	555	
Coal, blossom, trace, Little Fire Creek	..	555	50′
Shale	5	560	

	Thickness. Feet.	Total. Feet.	
Sandstone, grayish-white and hard	5	565	
Concealed and shale	10	575	
Sandstone	25	600	
Shale, buff, sandy, laminated	25	625	70′
Sandstone, current-bedded, coarse to medium-grained, making cliff, **Pineville**	75	700	
Concealed	30	730	105′
Pocahontas Group (230′)			
Sandstone, current-bedded, medium-grained, making cliff, **Flattop Mountain**	38	768	
Shale, gray, **Royal**	1.8	769.8	
Coal 0′ 2″ Concealed and **coal** blossom 8 8 Shale, gray 1 0 **Coal** 0 4 **No. 6 Pocahontas? No. 3?**	10.2	780	50′
Shale	5	785	
Sandstone, current-bedded	35	820	
Shale, buff, siliceous	15	835	
Sandstone, current-bedded, medium-grained, gray, making cliff	25	860	
Concealed	5	865	
Shale, black, siliceous, laminated	15	880	
Sandstone	5	885	
Shale, bluish-black, siliceous	4	889	
Sandstone	1	890	
Concealed	60	950	170′
Mauch Chunk Series (185′)			
Concealed	50	1000	
Sandstone, greenish, broken, making cliff, mouth of Manns Creek	75	1075	
Concealed to New River, mouth of Manns Creek	60	1135	185′

One and one-fourth miles southward the following section was measured with aneroid by the author mostly along the gorge of the run flowing down the steep eastern valley wall of New River. That portion above the top of the Upper Raleigh Sandstone was determined at the old abandoned **Mine No. 175 on Map II** in the Sewell Coal bed, 0.3 mile east of Sewell. In that portion below the top of the sandstone mentioned the results are excessive, owing to a dip of over 100 feet in the strata between the exposure of the ledge and that for the base of the section:

Sewell—0.9 Mile South Section, Sewell Mountain District.

	Thickness. Feet.	Total. Feet.	
New River and Pocahontas Groups (865')			
Coal, Sewell, (3' to 5') (Mine No. 175 on Map II)	5	5	
Shale and concealed, mostly shale	70	75	
Sandstone, current-bedded, quartzitic, pebbly, great cliff, Upper Raleigh	75	150	
Concealed	15	165	
Sandstone, massive, quartzitic, grayish-white, making cliff, **Lower Raleigh**	65	230	
Concealed and **coal blossom, Beckley**	10	240	240'
Concealed	10	250	
Shale, dark	5	255	
Concealed	120	375	
Sandstone	5	380	
Concealed	10	390	
Shale	5	395	155'
Sandstone, current-bedded, gray, making great cliff, **Pineville**	90	485	
Shale	5	490	
Concealed	75	565	
Sandstone	3.2	568.2	
Coal, soft.. 0' 6" **Coal, slaty 1 3** } **No. 6 Pocahontas? No. 3?**	1.8	570	175'
Sandstone, broken and shaly	20	590	
Concealed	25	615	
Sandstone, grayish-white and hard	20	635	
Concealed	130	765	
Shale, greenish, with iron ore nodules and layers of thin sandstones	25	790	
Sandstone, current-bedded, grayish-white..	75	865	295'
Mauch Chunk Series? (105')			
Shale, sandy and flaggy, hard	40	905	
Sandstone, greenish, micaceous, making cliff	25	930	
Concealed to C. & O. R. R. grade at East Sewell Station	40	970	105'

The basal 105 feet of the above section appear to belong in the Mauch Chunk Series, since the sandstone at 905 feet from the top resembles ledges in these measures, and the interval (820'—corrected for dip) below the Sewell Coal tends to confirm this hypothesis. In fact the top of the series may be 100 feet higher. However, no red beds were observed.

Two miles southwestward in the same District (Sewell Mountain) the author measured the following section with aneroid on the same hillside of New River northward via **Mines Nos. 176 and 196 on Map II** in the Sewell and Fire Creek Coal beds, respectively, and thence northeastward along the hill road to New River at Beury. In that portion above the latter coal the results are excessive, due to a dip of 40 to 50 feet in the strata between the top member and this coal, but the intervals below the latter were determined almost along the strike:

Beury Section, Sewell Mountain District.

	Thickness. Feet.	Total. Feet.	
New River Group (475')			
Coal, Sewell, (at Mine No. 176 on Map II) (1910' B.)	4	4	
Shale and concealed, mostly black siliceous shale	66	70	70'
Sandstone, Upper Raleigh, quartzitic, current-bedded, grayish-white, making great cliff	100	170	
Coal, Little Raleigh "A", slaty, lenticular	0.5	170.5	
Sandstone	1.5	173	
Concealed	3	175	
Slate, black, with **Lingula fossil shells**	5	180	
Concealed	10	190	120'
Sandstone, current-bedded, grayish-white, Lower Raleigh	45	235	
Concealed	65	300	
Sandstone, flaggy, making cliff, Quinnimont	61.9	361.9	
Coal, very soft, columnar .... 1' 10" **Coal,** soft......... 1 3 } **Mine No. 196 on Map II) Fire Creek** (1560' B.)	3.1	365	175'
Shale, sandy and concealed	25	390	
Shale, sandy, dark	10	400	
Sandstone, current-bedded, medium-grained, **Pineville**	58	458	
Shale, sandy	1.5	459.5	
Coal, slaty, No. 9 Pocahontas?	0.5	460	95'
Shale, sandy and flaggy	13.7	473.7	
Coal, slaty, No. 8 Pocahontas?	1.3	475	15'
Pocahontas Group (415')			
Sandstone, shaly at top and hard and current-bedded, basal ⅔rds, making great cliff, **Flattop Mountain?**	64.8	539.8	
Coal, (2") No. 7 Pocahontas?	0.2	540	65'
Shale	1	541	
Concealed	5	546	
Shale, black, **Royal**	8	554	
Coal, soft, No. 6 Pocahontas?, No. 3?	1	555	15'
Shale gray	2	557	
Sandstone, current-bedded, gray, **Eckman?**	48	605	
Shale, bluff, sandy	5	610	
Sandstone, massive	6	616	
Concealed	4	620	
Sandstone, flaggy	25	645	
Shale, dark, gray, sandy	5	650	
Concealed and dark shale	55	705	

	Thickness. Feet.	Total. Feet.	
Sandstone, massive, medium-grained, greenish-gray	65	770	
Concealed	5	775	
Sandstone, flaggy	40	815	
Concealed to C. & O. R. R. grade at Beury (1038′ L.)	45	860	
Concealed to New River	30	890	335′

In the above section the division line between the Pocahontas Group and the Mauch Chunk Series may belong in the 75 feet of concealed interval at the base. No characteristic red beds of the latter measures were observed.

Eight miles northeastward in Sewell Mountain District the author measured with aneroid the following section southwestward along the road and trail to the top of **Coal Test Boring No. 97 on Map II** located ¾ mile southward from Ravenseye, on the south bank and 5 feet above the bed of Manns Creek. The detailed log of this boring was not obtained, but the depth and thickness of the **Fire Creek Coal** are given on the authority of R. M. Smith, General Manager, Babcock Coal and Coke Company, of Landisburg, Fayette County:

Ravenseye Section, Sewell Mountain District.

	Thickness.	Total.	
New River Group (515.2′)			
Sandstone, grayish-white and hard, **Guyandot**	40	40	
Concealed	30	70	
Concealed in bench, **Sewell Coal horizon** (2650′ B.)	10	80	80′
Concealed, steeper slope	45	125	
Sandstone, grayish-white and hard, Upper Raleigh	75	200	
Concealed to top of **Coal Test Boring No. 97 on Map II.** (elevation, 2430′ B.)	90	290	210′
Unrecorded in Coal Boring No. 97	222	512	
Coal, Fire Creek, (3′ 2″)	3.2	515.2	225.2′

In the northeastern edge of the same district (Sewell Mountain) the author measured the following section with aneroid from the road summit, 1 mile north of Corliss, northeastward along the road and thence down the west hillside of Meadow River via Coal Opening No. 492 on Map II in the Sewell Coal bed, practically along the strike of the strata:

Corliss—One Mile North Section, Sewell Mountain District.

New River and Pocahontas Groups (810′)	Thickness. Feet.	Total. Feet.	
Sandstone, from road summit, 1 mile north of Corliss, **Harvey Conglomerate**	20	20	
Concealed	5	25	
Shale, buff, siliceous	15	40	
Concealed	10	50	
Sandstone	29	79	
Slate, black	1	80	
Shale, buff	22	102	
Fire clay shale	3	105	105′
Concealed	5	110	
Sandstone, grayish-white, Guyandot	60	170	
Concealed	4.5	174.5	
Coal, Sewell "B", at closed prospect, reported by J. B. Haynes	0.5	175	70′
Concealed in steep slope	80	255	
Shale, flaggy	3.5	258.5	
Coal, Sewell, at Clyde Jones opening, clean, bright, with "peacock" lustre (2475′ B.) **(No. 492 on Map II)**	1.5	260	85′
Concealed	52	285	
Sandstone, grayish-white, Upper Raleigh, making great cliff	60	345	
Concealed	39.5	384.5	
Coal, Little Raleigh, at closed prospect, reported by J. B. Haynes	0.5	385	125′
Concealed and sandstone	64	449	
Coal, soft, Beckley	1	450	65′
Concealed in steep slope	20	470	
Concealed in bench	20	490	
Concealed in steep slope, mostly sandstone	85	575	
Sandstone, pebbly, grayish-white, Quinnimont	55	630	
Concealed	5	635	
Shale, gray	2.7	637.5	
Coal, soft 0′ 7″ Slate, black 0 0¼ **Coal, soft** 1 8 } **Fire Creek (at Prospect No. 544 on Map II)**	2.3	640	190′
Slate and concealed	34.8	674.8	
Coal blossom, Little Fire Creek	0.2	675	35′
Sandstone, Pineville, and concealed to Meadow River at foot of hill road, north side, estimated	135	810	135′

Slightly over 2 miles southeastward the author measured with aneroid the following section eastward along the hill road to Rader Ford across Meadow River, the results being much less than they should be, owing to the rapid rise of the strata in the same direction:

Rader Ford of Meadow River Section, Sewell Mountain District.

New River and Pocahontas Groups (685′)	Thickness. Feet.	Total. Feet.	
Sandstone, grayish-white, Harvey Conglomerate, from road summit	50	50	
Concealed	83	133	
Coal, Castle, (2860′ B.) at closed digging (**No. 247 on Map II**) reported 18″ to	2	135	135′
Concealed	5	140	
Sandstone, grayish-white	15	155	
Concealed, mostly sandstone	60	215	
Concealed on bench	10	225	
Concealed, mostly grayish-white sandstone	60	285	
Spring, **Sewell Coal horizon**	..	285	150′
Concealed	325	610	325′
Sandstone, Pineville, grayish-white, forms great cliff	45	655	
Concealed to Meadow River at Rader Ford	30	685	75′

Four miles farther southeastward the following section was measured with aneroid by the author. That portion above the top of the Upper Raleigh Sandstone was measured from the road fork at the schoolhouse at the southwest end of Myles Knob southeastward along the James River & Kanawha Turnpike; and the balance, northeastward down the west hillside of Meadow River to the bed of the latter at Aldrich Camp, this portion being practically on the strike of the strata. The results, however, for the upper 173 feet of the section are less than they should be, owing to a rise of about 60 feet eastward of the rocks between the road fork and the crop of the Upper Raleigh Sandstone. The section is very important, in that it shows the true position in the rock column of the coal bed (No. 6 Pocahontas) that is being mined on a commercial scale at **Mine No. 222 on Map II,** located 1 mile northward from Rainelle:

Maywood-Aldrich Camp Section, Sewell Mountain District.

New River and Pocahontas Groups (833′)	Thickness. Feet.	Total. Feet.	
Shale, flaggy and buff, from road fork (3208′ L.)	38	38	
Coal, Sewell "B" (No. 251 on Map II) 18″ to	2	40	40′
Sandstone, flaggy	15	55	
Concealed	5	60	

	Thickness. Feet.	Total. Feet.	
Shale, dark and buff, laminated	10	70	
Concealed to road fork	13	83	43′
Concealed, mostly sandstone, (should hold **Sewell Coal**)	30	113	
Shale, buff	20	133	
Sandstone, platy and shaly, **Welch**	15	148	
Shale, buff and sandy	19.7	167.7	
Coal, Welch	0.3	168	85′
Shale, gray	5	173	
Sandstone, grayish-white, making great cliff, east of Maywood, **Upper Raleigh**	50	223	
Concealed	315	538	370′
Sadnstone, Pineville, grayish-white	50	588	
Concealed	101	689	
Coal, No. 6 Pocahontas, at closed opening **(No. 569 on Map II)** of Meadow River Lumber Company, reported clean and 48″ thick by W. F. Hall, Superintendent	4	693	155′
Interval to Meadow River at Aldrich Camp	140	833	140′

Slightly over 2 miles southwest of Maywood the following succession of the strata is obtained by combining a section measured with aneroid by **the author southeastward** along a road and trail, with the log of **Coal Test Boring No. 112 on Map II,** on the north bank of Glade Creek, 0.2 mile southeast of Sims Schoolhouse. The detailed log of this boring was kindly furnished the Survey by the New River and Pocahontas Coal & Coke Co., through their land agent, Mr. J. S. Cunningham of Charleston, along with 30 others drilled by them in Sewell Mountain and Quinnimont Districts, but permission was not granted to publish the thickness and details of the coal beds encountered in all of them, so that in the section the coal beds are given at base in combination with other members to conceal these data. It shows the No. 6 Pocahontas Coal belonging 150 feet below the Fire Creek bed. The intervals in that portion above the top of the boring are less than they should be owing to a rise to the southeast of about 75 feet in the strata between the top exposure and the boring:

Sims Schoolhouse Section, Sewell Mountain District.

	Thickness. Feet.	Total. Feet.	
New River and Pocahontas Groups (817′)			
Sandstone and concealed	24	24	
Coal blossom, Hughes Ferry	1	25	25′
Concealed to road fork (3077′ L.)	35	60	

	Thickness. Feet.	Total Feet.	
Concealed	70	130	
Sandstone, grayish-white, **Guyandot**	45	175	
Shale, buff, and sandy	5	180	
Concealed	4.5	184.5	
Coal, Sewell "B" (5")	0.5	185	160′
Concealed	55	240	
Shale, dark	5	245	
Concealed	10	255	
Coal blossom, Sewell, and black slate (2880′ B.)	5	260	75′
Shale and concealed	35	295	
Sandstone and concealed in steep slope	20	315	
Sandstone	5	320	
Concealed	10	330	
Concealed in bench	10	340	80′
Sandstone, grayish-white, quartzitic, making cliff, Upper Raleigh	45	385	
Concealed	60	445	
Sandstone, grayish-white, quartzitic, Lower Raleigh	40	485	
Concealed to top of **Coal Test Boring No. 112 on Map II)**	50	535	195′
(Continued with log of Coal Test Boring No. 112)			
Shale and sandstone, alternating	102.6	637.6	
Shale, dark, and **coal, Fire Creek** (2512′ L.)	26.3	663.9	128.9′
Shale and **coal, Little Fire Creek** (2490′ L.)	22	685.9	
Shale and sandstone alternating	42.9	728.8	
Sandstone, Pineville	32.4	761.2	
Shale and sandstone alternating and **coal, No. 6 Pocahontas** (2361′ L.)	53.6	814.8	150.9′
Shale, dark, and soapstone	2.2	817	2.2′

Slightly over two miles southeastward in the southeastern edge of Sewell Mountain District, the author measured the following section with aneroid from the road fork on Sewell Mountain ridge, southeastward along the road and trail to the bed of Sewell Creek at Sievy Bridge station on the Sewell Valley Railroad, the intervals here being much less than they should be, owing to a rise of about 160 feet in the strata eastward between the road fork and the basal exposure:

Sievy Bridge Station Section, Sewell Mountain District.

	Thickness. Feet.	Total. Feet.	
New River and Pocahontas Groups, Pottsville, Series (630′)			
Sandstone and concealed from road fork (3150′ L.)	15	15	15′
Sandstone, grayish-white, making great cliff, Upper Raleigh	80	95	

	Thickness. Feet.	Total. Feet.	
Concealed	10	105	
Concealed in bench (Little Raleigh Coal horizon	10	115	100′
Concealed, in steep slope, mostly sandstone, Lower Raleigh	93.5	208.5	
Coal, Fire Creek, at closed prospect, (No. 549 on Map II), reported 18″ (2935′ B.)	1.5	210	95′
Concealed	25	235	
Black slate, partly concealed	25	260	
Concealed	24	284	
Coal, slaty	1	285	75′
Shale, gray	5	290	
Sandstone, grayish-white	45	335	
Concealed	30	365	
Coal blossom, heavy, No. 6 Pocahontas, (Exposure No. 571 on Map II), in old tree grove (2775′ B.)	5	370	85′
Sandstone, grayish-white	85	455	
Concealed	15.3	470.3	
Sandstone	5	475.3	
Coal, soft........ 1′ 3″ Slate, black, ¼″ to 0 0½ Coal, soft, 24″ to 2 2½ Bone, 6″ to...... 0 8 Coal, soft, 4″ to.. 0 6 (Opening No. 596 on Map II) (4′ 8″) No. 3 Pocahontas (2665′ B.)	4.7	480	110′
Slate and concealed	150	630	150′
Mauch Chunk Series (70′)			
Shale, red, and concealed to bed of Sewell Creek at Sievy Bridge	70	700	70′

SPECIAL SECTIONS, QUINNIMONT DISTRICT.

Quinnimont District lies in the extreme southeastern portion of Fayette County, its surface rocks belonging exclusively in the New River and Pocahontas Groups of the Pottsville and in the Mauch Chunk Series, with the exception of some narrow belts of Quaternary alluvial deposits along the valley floors of the larger streams. By far the greater portion of its outcropping strata is composed of New River strata, the Mauch Chunk beds being confined to narrow belts along the valley walls of New River and Meadow Creek and the adjacent portion of their tributaries, in the western and southern borders, and the waters of Sewell Creek in the eastern region. Several sections will now be given along the New River gorge, the following having been measured with aneroid by the writer southward from the old abandoned Mine No. 202

on Map II of the Alaska Coal & Coke Company in the Fire Creek Coal bed to New River at the mouth of Buffalo Creek. The results represent almost vertical determinations, as the southward rise in the strata between the mine and the river does not much exceed 25 feet. The base of the Pottsville has been placed tentatively at 549 feet from the top, but may belong in the concealed interval, 100 feet higher in the measures. The interval between the Fire Creek Coal and the first red beds at the top of the Mauch Chunk is so variable in this region that it can only be relied on within certain limits to fix the division plane between the latter series and the Pottsville when the same is not exposed for study:

Alaska—0.8 Mile East Section, Quinnimont District.

	Thickness. Feet.	Total. Feet.	
New River and Pocahontas Groups, Pottsville Series (549′)			
Coal, Fire Creek, at Mine No. 202 on Map II (2175′ B.)	4	4	
Concealed	60	64	
Sandstone, grayish-white, Pineville	55	119	
Concealed	95	214	
Sandstone, grayish-white, current-bedded, making great cliff	60	274	
Concealed in steep slope, mostly sandy shale and flaggy sandstone	200	474	
Sandstone, gray, current-bedded, making cliff	75	549	549′
Mauch Chunk Series (561′)			
Concealed in steep slope	40	589	
Concealed in wide, flat bench	20	609	
Concealed in steep slope	140	749	
Reddish soil, strata concealed in steep slope	180	939	
Concealed and red shale to C. & O. R. R. grade, mouth of Buffalo Creek	135	1074	
Concealed to New River	36	1110	561′

Five and a half miles southwestward in the edge of Raleigh County the following section was measured by Teets eastward down the steep valley wall of New River via **Mine No. 205 on Map II** in the Fire Creek Coal bed, 0.6 mile southwest of Terry, and published on pages 69-70 of the Raleigh County Report. The results represent almost vertical determinations and show that the marine fossiliferous **Terry Limestone** belongs 346 feet below the top of the Mauch Chunk Series and 12½ feet below the base of the **Princeton Conglomerate Sandstone**:

Terry Section, Town District, Raleigh County.

New River and Pocahontas Groups (467′)	Thickness. Ft.	In.	Total. Ft.	In.	
Concealed	50	0	50	0	
Slate and shale	9	0	59	0	
Coal .... 4′ 2″ Slate, dark.. 4 0 **Coal** .... 1 0 } **Fire Creek**	9	2	68	2	68′ 2″
Slate, iron nodules	1	10	70	0	
Sandstone, massive	50	0	120	0	
Shale, sandy, and sandstone	70	0	190	0	
Sandstone, massive, medium-grained	90	0	280	0	
Concealed	60	0	340	0	
Sandstone and concealed	35	0	375	0	
Shale, slaty	20	0	395	0	
Sandstone, massive, coarse-grained	70	0	465	0	
Sandy shale	2	0	467	0	
Mauch Chunk Series (398′)					
Shale	3	0	470	0	
Shale, gray	5	0	475	0	
Shale, red	5	0	480	0	
Shale, gray	10	0	490	0	
Shale, red	2	0	492	0	
Shale, gray	3	0	495	0	
Shale, red	15	0	510	0	
Sandstone, massive, fine-grained	20	0	530	0	
Shale, green and red	30	0	560	0	
Sandstone, massive	20	0	580	0	
Concealed, bench	5	0	585	0	
Sandstone and concealed	7	0	592	0	
Shale, slaty, impure **coal** streaks	3	0	595	0	526′ 10″
Shale, sandy	25	0	620	0	
Concealed, bench	20	0	640	0	
Shale, sandy, and concealed	50	0	690	0	
Sandstone and concealed	50	0	740	0	
Shale, sandy	50	0	790	0	
Sandstone, massive, medium-grained	10	0	800	0	
Sandstone, full of pebbles, brown specks	0	6	800	6	
Shale, gray	12	6	813	0	
Limestone, gray, marine fossils, Terry	1	0	814	0	
Sandstone, gray	2	0	816	0	
Coal, impure	0	3	816	3	221′ 3″
Shale, gray, slaty	0	9	817	0	
Sandstone	8	0	825	0	
Shale, greenish-red	5	0	830	0	
Sandstone, gray	10	0	840	0	
Concealed to bottom, elevation, 1760′ B.	25	0	865	0	48′ 9″

Two miles eastward in the edge of Raleigh County the following section was measured with aneroid by the author northward down the steep hillside of New River via **Mine No. 207 on Map II**:

Royal Section, Raleigh County.

	Thickness. Feet.	Total. Feet.	
New River and Pocahontas Groups (410')			
Shale, black, laminated, **Quinnimont**	6	6	
Coal, soft, Fire Creek, (Mine No. 207 on Map II) (2140' B.)	4	10	10'
Shale and sandstone	25	35	
Shale	4.7	39.7	
Coal	0.3	40	30'
Sandstone and shale, alternating	19.4	59.4	
Coal, (7") Little Fire Creek	0.6	60	20'
Sandstone, Pineville	55	115	
Concealed	55	170	
Shale, Royal, buff, sandy, with brackish-water fossil shells, Naiadites elongata*.	8	178	
Coal, soft.. 1' 0" Slate, dark 0 1 **Coal, soft.. 0 11** — **No. 6 Pocahontas (1975' B.)**	2	180	120'
Slate, black	4	184	
Concealed and shale	31	215	
Sandstone, making cliff	40	255	
Concealed and shale	35	290	
Sandstone, making great cliff	90	380	
Shale and concealed	30	410	230'
Mauch Chunk Series (565')			
Shale, red, and concealed	5	415	
Sandstone, making great cliff	105	520	
Concealed and shale	215	735	325'
Sandstone, massive, conglomeratic, large quartz pebbles, reddish-white, **Princeton Conglomerate**	50	785	
Concealed to C. & O. R. R. grade, foot of Royal incline (1215' B.)	150	935	200'
Concealed to bed of New River	40	975	40'

The foregoing section is interesting in that it shows the **No. 6 Pocahontas Coal** with its associated **brackish-water fossil-bearing Royal Shale** belonging 170 feet below the Fire Creek bed and that the **Princeton Conglomerate Sandstone** belongs about 325 feet below the top of the Mauch Chunk Series instead of 220 feet as shown for the same point in the following section, published by I. C. White in Volume II(A) of the State

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*Raleigh County Report, W. Va. Geological Survey, pp. 675 and 679; 1916.

Survey Reports, pages 21-23, obtained by combining the log of Coal Test Boring No. 150 on Map II, located 1.5 miles southward from Royal, with measurements determined with aneroid down the south hillside of New River at Royal. The base of the Pottsville Series should belong slightly over 100 feet higher than originally shown, or in the 22 feet of concealed interval, 616′ 7″ from the top of the section:

Grandview—Royal Section, Shady Spring District, Raleigh County.

New River and Pocahontas Groups (638′ 7″)	Thickness.		Total		
	Ft.	In.	Ft.	In.	
Surface	10	5	10	5	
Sandstone, Lower Raleigh	58	3	68	8	68′ 8″
Sandstone, hard	27	5	96	1	
Slate and rock	0	9	96	10	
Sandstone	2	2	99	0	
Slate	2	6	101	6	
Coal .... 1′ 0¼″ Slate and **coal** 0 2¾ **Beckley** "Lost" 0 0¾	1	3¾	102	4¾	34′ 1¾″
Slate	0	3½	103	1¼	
Sandstone	11	3¾	114	5	
Sandstone, slaty	24	1	138	6	
Slate	0	6	139	0	
Sandstone	21	0	160	0	
Slate, sandy	3	1	163	1	
Slate	11	0	174	1	
Sandstone	0	9	174	10	
Slate	3	6	178	4	
Sandstone	13	6	191	10	
Slate, sandy	21	2	213	0	
Slate	12	8½	225	8½	
"Lost" **coal**...... 1′ 1″ **Fire Creek** **Coal** 2 0	3	1	228	9½	125′ 11¾″
Slate	0	6	229	3¼	
Fire clay	5	1	234	4½	
Sandstone	13	5	247	9½	
Slate, sandy	2	5	250	2½	
Slate	1	3	251	5½	
Coal, Little Fire Creek	0	6	251	11½	23′ 2″
Slate	3	6	255	5½	
Sandstone and sandy slate.. 10′ 3 ″ Slate .... 17 6 **Pineville** Sandstone 23 2½	50	11½	306	5	
Slate, sandy	2	3	308	8	
Coal .... 0′ 7″ **No. 9** "Lost" **coal**. 0 5 **Pocahontas**	1	0	309	8	57′ 8½″
Fire clay	3	6	313	2	
Shale, sandy	54	2	367	4	

	Thickness. Ft.	Thickness. In.	Total. Ft.	Total. In.	
Sandstone, **Pierpont**	36	0	403	4	
Shale, sandy	11	6	414	10	
Sandstone, **Eckman**	51	0	465	10	
Coal, No. 4 Pocahontas	1	8	467	6	157' 10"
Fire clay	2	8	470	2	
Shale, gray, sandy	3	1	473	3	
Sandstone, **Upper Pocahontas**	39	0	512	3	
Coal .... 0' 6" **Coal**, bony.... 0 5 Fire clay..... 0 10 **Coal**, bony.... 0 2 **Coal** .... 1 5 Fire clay..... 2 10 Sandstone, gray .... 3 7 Slate, black.. 1 0 **Coal** .... 1 3 **No. 3 Pocahontas**	12	0	524	3	56' 9"
Sandstone to bottom of boring	6	4	530	7	
(Continued from surface exposures)					
Sandstone, massive	50	0	580	7	
Concealed	20	0	600	7	
Shale, gray	10	0	610	7	
Shale, bituminous, dark	1	0	611	7	
Shale, gray	5	0	616	7	
Concealed	22	0	638	7	
Mississippian (625')					
Shale, gray	5	0	643	7	
Sandy beds, greenish-gray and yellow shale	23	0	666	7	
Concealed, with massive greenish shale	70	0	736	7	
Shale, reddish-green, sandstone and concealed	220	0	956	7	
Sandstone, Princeton Conglomerate, great massive cliff, pebbly	50	0	1006	7	
Red beds and concealed	50	0	1056	7	
Sandstone, coarse, massive	20	0	1076	7	
Shale, red, with limy beds near center	30	0	1106	7	
Sandstone, fine-grained	5	0	1111	7	
Shale and sandstone, to level of track at mouth of Stretcher Neck Tunnel	12	0	1123	7	
Concealed to level of New River, elevation 1255' B	40	0	1163	7	

It is quite evident from a study of the two preceding sections that the No. 6 Pocahontas Coal and the Royal Shale have been cut away in **Coal Test Boring No. 150 on Map II**, the log of which was used in the upper 530' 7" of the section last given, a feature that is characteristic of the Pottsville beds, in that these are subject to sudden local changes in thickness.

The following section was measured with aneroid southwestward along the hill road to Quinnimont from the top of the Upper Raleigh Sandstone cliff from an exposure 1 mile northeast of the latter place. The results are greater than they should be, owing to the marked dip in the strata prevailing here in the same direction:

Quinnimont—North Side Section, Quinnimont District.

	Thickness. Feet.	Total. Feet.	
New River and Pocahontas Groups, Pottsville Series (960′)			
Sandstone, quartzitic, pebbly, massive, grayish-white, making great cliff, Upper Raleigh	150	150	150′
Concealed	105	255	
Shale	10	265	
Concealed, with sandstone boulders	70	335	
Concealed, should hold **Fire Creek Coal** 30′ to 40′ above base	130	465	315′
Sandstone, current-bedded, brown to grayish-white, Pineville	70	535	
Concealed in steep slope	40	575	
Concealed in bench	10	585	120′
Sandstone, current-bedded, brown to gray, making great cliff, Upper Pocahontas	93	678	
Shale, buff and sandy	5.1	683.1	
Coal, soft, No. 3 Pocahontas (22″) (1880′ B.)	1.9	685	100′
Sandstone, broken, Lower Pocahontas	50	735	
Concealed	64	799	
Coal, No. 1 Pocahontas (6″ visible)	1	800	115′
Shale	10	810	
Concealed in bench	15	825	
Sandstone, making cliff	45	870	
Concealed in steep slope	15	885	
Concealed in flat bench, mostly shale	15	900	
Sandstone and concealed, steep slope, mostly sandstone	40	940	
Concealed and sandstone	14.5	954.5	
Coal, slaty (6″)	0.5	955	
Fire clay shale	5	960	160′
Mauch Chunk Series (425′)			
Shale, green and red	15	975	
Concealed and red shale	35	1010	
Sandstone, green, micaceous	5	1015	
Shale, brown and red	20	1035	
Concealed	100	1135	
Shale, red, and concealed	150	1285	
Shale, red, with sandstone layers, to C. & O. R. R. grade at Quinnimont (1205′ L.)	60	1345	
Concealed to bed of New River, estimated	40	1385	425′

The following section was measured with aneroid by the author northwestward along the hill road to the bed of Laurel Creek from **Mine No. 208 on Map II** in the Fire Creek Coal bed, the latter being located ¾ mile southeast of Quinnimont:

Quinnimont—South Side Section, Quinnimont District.

	Thickness. Feet.	Total. Feet.	
New River and Pocahontas Groups, Pottsville Series (550′)			
Coal, Fire Creek, (Mine 208 on Map II) (2200′ B.) 30″ to	4	4	
Shale, black	31	35	
Concealed	235	270	
Sandstone, grayish-white, making cliff	50	320	
Concealed in bench	15	335	
Sandstone, making cliff	45	380	
Concealed	170	550	550′
Mauch Chunk Series (480′)			
Concealed	240	790	240′
Sandstone, grayish-white, cliff, Princeton Conglomerate	45	835	
Shale, brown and sandy	15	850	
Concealed	10	860	
Shale, greenish-brown and sandy	60	920	
Concealed	54	974	
Sandstone	6	980	
Shale, red	15	995	
Sandstone and red shale	15	1010	
Concealed to bed of Laurel Creek at Quinnimont	20	1030	240′

In the above section the results are excessive in the upper half of the section, due to a dip of 50 to 60 feet in the strata westward.

The following section was measured with aneroid by the author northwestward along the road down the steep hillside of Laurel Creek from the old abandoned **Mine No. 211 on Map II** of the Glendale Coal Company in the Fire Creek Coal bed. Between the mine and Laurel Creek at this point the strata are practically horizontal, so that the results represent almost vertical determinations:

Lawton—0.5 Mile Southwest Section, Quinnimont District.

	Thickness. Feet.	Total. Feet.	
New River and Pocahontas Groups, Pottsville Series (530′)			
Coal, Fire Creek, at Mine 211 on Map 11 (2485′ B.)	3.5	3.5	
Shale and concealed	10	13.5	
Shale, black, argillaceous, plant fossils abundant	16.5	30	
Concealed and shale	10	40	40′
Sandstone, Pineville, gray, quartzitic, current-bedded, hard, weathers white, making great cliff	60	100	
Concealed	5	105	
Coal blossom and concealed	6	111	
Shale, buff	2.4	113.4	
Coal, slaty.. 0′ 6″ Slate, black.. 0 1 **Coal,** soft.... 0 10 **Coal,** slaty... 0 2½ **No. 6 Pocahontas..** (2365′ B.)	1.6	115	75′
Shale and concealed	15	130	
Sandstone, grayish-white, current-bedded, making cliff	65	195	
Concealed in bench	20	215	
Sandstone, grayish-white	15	230	
Concealed	10	240	
Sandstone, grayish-white and concealed	30	270	
Sandstone, grayish-white, making cliff	40	310	
Sandstone, grayish-white, partly concealed	30	340	
Concealed	40	380	
Sandstone, shaly	10	390	
Concealed	20	410	
Sandstone, shaly	10	420	
Concealed	10	430	
Sandstone	10	440	
Concealed	45	485	
Coal blossom	0	485	
Concealed	45	530	
Mauch Chunk Series (70′)			
Shale, red, and concealed to C. & O. R. R. grade, from exposure on opposite side of Creek	15	545	
Concealed to bed of Laurel Creek	55	600	

In the extreme southern point of Quinnimont District and Fayette County, the author measured the following section with aneroid from an exposure of the Upper Raleigh Sandstone cliff at the road fork, 2 miles N. 5° W. from the mouth of Meadow Creek, southward along the hill roads to the bed of New River at the latter point. The section is probably the longest yet published in the State from outcrop exposures in the same hill, and the total—1960 feet—should be increased about 140 feet on account of the southeastward rise of the strata, or to a total of 2100 feet:

Meadow Creek Station Section, Quinnimont District.

	Thickness. Feet.	Total. Feet.	
New River and Pocahontas Groups, Pottsville Series (735′)			
Sandstone, Upper Raleigh, grayish-white, making cliff, from road fork and summit	55	55	
Concealed, steep slope	105	160	
Concealed in bench	10	170	
Sandstone, grayish-white, current-bedded	40	210	
Concealed, mostly sandstone	50	260	
Concealed and shale, mostly shale, in gentle slope	85	345	345′
Sandstone, Pineville, grayish-white	70	415	
Concealed	15	430	
Sandstone, grayish-white	30	460	
Concealed	21	481	
Sandstone	4	485	
Coal, No. 6 Pocahontas, soft, columnar, 4′, (Opening No. 224 on Map II) (2683′ L.)	5	490	145′
Slate and concealed	115	605	
Black slate, blossom	5	610	120′
Sandstone and concealed, mostly concealed	90	700	
Concealed in bench	10	710	
Concealed	25	735	125′
Mauch Chunk Series (1225′)			
Shale, red	60	795	
Concealed	25	820	
Sandstone, greenish-gray, medium-grained	30	850	
Concealed	30	880	
Shale, purplish-red	15	895	
Concealed	25	920	
Sandstone, grayish-white and brown, medium-grained, hard	65	985	
Shale, red	20	1005	
Sandstone, green	5	1010	
Concealed	25	1035	
Sandstone, green, micaceous	40	1075	340′
Sandstone, Princeton Conglomerate, grayish-white, hard, conglomeratic, large quartz pebbles, making great cliff	40	1115	
Concealed	15	1130	
Shale, red, sandy, with 2 or 3 layers of thin sandstone	45	1175	
Shale, green, siliceous	30	1205	
Concealed	30	1235	
Concealed in flat bench 150 feet wide	15	1250	
Concealed	45	1295	

	Thickness. Feet.	Total Feet	
Shale, green	20	1315	
Shale, red	5	1320	
Concealed	15	1335	
Shale, red and variegated	25	1360	
Concealed	15	1375	
Shale, red and green, alternating	35	1410	
Concealed	165	1575	
Shale, dark-red, with gray limestone nuggets 6" in diameter	10	1585	
Concealed and sandstone, fine-grained, reddish-green	15	1600	
Concealed	80	1680	
Shale, red	15	1695	
Concealed in bench at road bend, with rounded boulders 1" to 6" in diameter, old river terrace	15	1710	635′
Concealed	10	1720	
Shale, red	55	1775	
Concealed to road fork, ground strewn with large boulders from Princeton Conglomerate	70	1845	
Concealed to C. & O. Railroad grade, Meadow Creek Station	80	1925	215′
Concealed to New River	35	1960	

Slightly over 2 miles eastward the following section was measured with aneroid by the author from the summit of the high knob, just east of the Eburnean Schoolhouse, southwestward to the road and thence with the latter southward to the bed of Meadow Creek at the mouth of Beelick Run, ½ mile northeast of Beurytown. The results are less than they should be, owing to the southward rise in the strata from the summit of the knob in question, as revealed by the Sewell Coal contours on Map II:

Beurytown Section, Quinnimont District.

	Thickness. Feet.	Total. Feet.	
New River and Pocahontas Groups, Pottsville Series (435′)			
Concealed, in steep slope from summit of knob	75	75	
Concealed in gentle slope	40	115	
Concealed in flat bench and shale	15	130	130′
Sandstone, Pineville, grayish-white and hard, making great cliff	60	190	
Concealed	76	266	
Coal, No. 6 Pocahontas (Exposure No. 588 on Map II)	4	270	140′

	Thickness. Feet.	Total. Feet.	
Fire clay shale and concealed	10	280	
Sandstone	25	305	
Shale, buff, siliceous	4.5	309.5	
Coal, soft, No. 4 Pocahontas (2710′ B.)	0.5	310	40′
Shale, buff	5	315	
Concealed	25	340	
Shale, dark	7.7	347.7	
Coal, soft... 0′ 11″ Shale, gray. 0 5 **Coal, soft**... 0 2½ Shale, gray. 0 0½ **Coal, soft**... 0 8 **No. 3 Pocahontas Coal** (2630′ B.) (2′ 3″)	2.3	350	40′
Shale, and concealed	20	370	
Shale, buff, siliceous	19.2	389.2	
Coal, soft, No. 2 Pocahontas, edge of road	0.8	390	40′
Shale, greenish-white, buff, siliceous	35	425	
Concealed (2550′ B)	10	435	45′
Mauch Chunk Series (955′)			
Shale, greenish, siliceous	40	475	
Sandstone, green	10	485	
Shale, red, siliceous	35	520	
Sandstone, green	30	550	
Shale, dark-red	30	580	
Sandstone, green, micaceous	25	605	
Concealed to road fork	100	705	270′
Sandstone, Princeton Conglomerate, greenish-gray, conglomeratic, almost mass of quartz pebbles, making cliff	75	780	
Concealed and shale	25	805	
Shale, green, siliceous	10	815	
Concealed	10	825	
Shale, red, siliceous	30	855	
Shale, green, siliceous	35	890	
Sandstone, hard	5	895	
Shale, red, and concealed	35	930	
Bench at road bend	5	935	
Sandstone, greenish-white, red shale layers	50	985	
Concealed	25	1010	
Shale, red, siliceous	15	1025	
Concealed	135	1160	
Sandstone, green, micaceous	5	1165	
Shale, red	10	1175	
Concealed, mostly reds	215	1390	685′

The following succession of the strata is obtained by combining a section measured with aneroid by the author from the summit of the high knob, ½ mile northwest of Walnut Flat Schoolhouse, southeastward, with the log of **Coal Test Boring No. 136 on Map II,** 0.6 mile south of the same schoolhouse and 1.5 miles northwest of Meadowbridge (Clute P. O.), drilled by the New River & Pocahontas Coal & Coke Company. As with the log of Boring No. 112 on Map II, given partially with the

Sims Schoolhouse Section on a preceding page of this Chapter, permission was not given to publish the thickness of coal beds encountered in the boring, the coals, for correlation purposes, being given at base in combination with other members in order to conceal this feature:

Walnut Flat Schoolhouse Section, Quinnimont District.

	Thickness. Feet.	Total. Feet.	
New River and Pocahontas Groups (521′)			
Sandstone, grayish-white, making cliff and capping ridge, **Upper Raleigh**	35	35	
Concealed and dark shale	52.1	87.1	
Coal, soft.. 2′ 4″ **Coal**, slaty 0 2 **Coal**, soft.. 0 4 } **Little Raleigh** (3025′ B.)	2.9	90	90′
Slate and concealed	25	115	
Concealed in steep slope, mostly sandstone	185	300	
Concealed in terrace, 75 yards wide	30	330	240′
Sandstone, grayish-white, **Pineville**, to road at Walnut Flat Schoolhouse	35	365	
Interval to top of Coal Test Boring No. 136 on Map II	15	380	50′
(Continued with log of Boring No. 136) (2810′ B.)			
Surface debris	7.3	387.3	
Sandstone and shale, alternating, and **Coal No. 7 Pocahontas**	49.4	436.7	56.7′
Shale and sandstone, alternating, and **Coal, No. 6 Pocahontas**	79.5	516.2	79.5′
Soapstone and shale to bottom of hole	4.8	521	4.8′

Six miles northeastward in the edge of Greenbrier County, the following section was measured with aneroid by the writer from the summit of the knob immediately west of Boggs Knob, southwestward to **Coal Opening No. 221 on Map II**, and thence northwestward along the hill road to the bed of Sewell Creek at Sims Station on the Sewell Valley Railroad. In that portion below the base of the New River Group, the results are excessive on account of a dip of about 250 feet in the strata between the exposure of the top member of the Pocahontas Group and Sims Station:

Boggs Knob—Sims Station Section, Greenbrier County.

	Thickness. Feet.	Total. Feet.	
New River Group (410′)			
Sandstone and concealed from summit of knob, 0.3 mile west of Boggs Knob	45	45	
Concealed in bench	10	55	55′
Sandstone, grayish-white, Lower Raleigh	77	132	
Concealed at spring of water, **Beckley Coal horizon**	3	135	80
Concealed	130.4	265.4	
Shale, dark, visible	2	267.4	
Coal, bony, 6″ to 0′ 8″ **Coal, soft** 1 11 } **Little Fire Creek?** (Opening No. 221 on Map II)	2.6	270	135′
Concealed	25	295	
Sandstone	30	325	
Concealed in bench	10	335	65′
Sandstone, current-bedded, grayish-white, Pineville	55	390	
Concealed to road fork	20	410	
Pocahontas Group (225′)			
Concealed and shale	55	465	
Coal blossom, trace	..	465	
Concealed	4.3	469.3	
Coal, No. 6 Pocahontas? (visible 8″) (3030′ B.)	0.7	470	135′
Sandstone, **Eckman**	30	500	
Shale	4.5	504.5	
Coal, slaty, No. 5 Pocahontas?	0.5	505	35′
Shale	5	510	
Sandstone and shale	19.5	529.5	
Coal, soft, No. 3 Pocahontas?	0.5	530	25′
Fire clay shale	3	533	
Concealed and sandstone	62	595	
Black slate	3	598	68′
Fire clay shale	2	600	
Shale, reddish-brown	15	615	
Sandstone, shaly	20	635	37′
Mauch Chunk Series (455′)			
Shale, dark-red, in road just below church	10	645	
Red shale and sandstone, alternating, to bed of Sewell Creek at Sims Station on Sewell Valley Railway	445	1090	455′

Slightly over a mile southeastward in the eastern point of Quinnimont District, the following section was measured with aneroid by the writer from the road summit, 0.7 mile northwest of Turniphole Mountain, southward along the hill road to the Mauch Chunk red beds, immediately below the base of the Pottsville Series:

Turniphole Mountain—½ Mile Northwest Section, Quinnimont District.

	Thickness. Feet.	Total. Feet.	
New River and Pocahontas Groups, Pottsville Series (311′)			
Sandstone, grayish-white, **Pineville**	45	45	
Concealed	5	50	
Sandstone, shaly..........................	35	85	
Concealed	5	90	
Shale, black, Royal, Lingula fossil shells abundant	9	99	
Coal, soft, No. 6 Pocahontas (Exposure No. 576 on Map II)........................	4	103	103′
Shale, gray and dark......................	10	113	
Coal, blossom, heavy, No. 6 Pocahontas, lower bench	2	115	12′
Concealed and shale, sandy...............	39.5	154.5	
Coal, slaty, (6″), **No. 4 Pocahontas**........	0.5	155	40′
Sandstone, coarse, broken, **Upper Pocahontas**	13	168	
Shale	1.5	169.5	
Coal, soft, (5″), **No. 3 Pocahontas**.........	0.5	170	15′
Shale, sandy	5	175	
Shale, flaggy, and sandy..................	29	204	
Coal, soft.. 0′ 8″ Shale, gray 0 1 **Coal,** soft.. 0 1 } **No. 2 Pocahontas**........ (10″)	1	205	35′
Sandstone, shaly at bottom................	15	220	
Concealed and sandstone.................	55	275	
Fire clay shale..........................	5	280	
Concealed and sandstone to red shale, top of **Mauch Chunk Series**..................	31	311	106′

Slightly less than one mile southeastward the following section was measured from the summit of Turniphole Mountain westward to an opening in the **No. 6 Pocahontas Coal bed—No. 577 on Map II**; thence northwest along trail to the road fork, and thence southward to road fork near Buffalo School. The strata are so nearly horizontal between the summit of the knob and the last-mentioned road fork that the results represent practically vertical determinations:

Turniphole Mountain Section, Quinnimont District.

	Thickness. Feet.	Total Feet.	
New River and Pocahontas Groups (375′)			
Shale, capping summit of Turniphole Mountain	5	5	
Sandstone, grayish-white, Pineville........	60	65	65′
Concealed	15	80	
Sandstone, grayish-white	15	95	
Concealed and shale	63.7	158.7	
Coal, soft......... 4′ 0″ Slate, dark-gray, with **coal** streaks 1 4 **Coal**, soft, bright 1 0 (Opening No. 577 on Map II) **No. 6 Pocahontas**	6.3	165	100′
Slate and concealed	45	210	
Concealed	40	250	
Sandstone	45	295	
Shale	5	300	
Sandstone	20	320	
Concealed	19	339	
Fire clay shale, dark	5	344	
Concealed and sandstone	31	375	210′
Mauch Chunk Series (365′)			
Shale, red	40	415	
Sandstone, green	5	420	
Shale, dark-red, with thin sandstones	70	490	
Concealed and red shale to road fork (2480′ L.)	250	740	365′

SUMMARY OF SECTIONS.

The following table has been compiled for convenience of reference from the sections on preceding pages of this Chapter. It shows at a glance, not only the three main divisions—Pennsylvanian, Mississippian, and Devonian—of the surface rocks or those penetrated by test borings for coal, oil and gas, but. in most instances, that for their subdivisions or series. A line of dots under the latter indicates that the formation was not exposed, measured or penetrated by a boring if the latter is used in a section; and a question mark (?), that the series or group was present and measured but could not be definitely separated from the formation either overlying or underlying it. Frequently thicknesses are excessive or too little, owing to the dip of the strata prevailing where the results were determined. An explanation accompanies each section, giving the peculiar conditions under which the measurements were made:

Table Showing Thickness in Feet of Stratified Rocks in Fayette County.

PLACE MEASURED	PENNSYLVANIAN						MISSISSIPPIAN				DEVONIAN			Total Section
		Pottsville Series												
	Allegheny	Kanawha	New River	Pocahontas	Total Pottsville	Total Pennsylvanian	Mauch Chunk	Greenbrier Limestone	Pocono Sandstones	Total	Catskill	Chemung	Total	
Alaska—0.8 mi. S. E.	......	......	(?)	(?)	549	549	561	......	......	561	......	......	......	1110
Albion—Woods Ferry	......	690	375	......	1065	1065	......	......	......	......	......	......	......	1065
Ansted—Hawks Nest	110	1045	580	......	1625	1735	......	......	......	......	......	......	......	1735
Beckwith—1.7 mi. W	......	540	......	......	540	540	......	......	......	......	......	......	......	540
Belva—0.7 mi. S	......	1216	(?)	(?)	2066	2066	359	161	189	709	......	......	......	2775
Belva—1 mi. N.E	80	865	......	......	865	945	......	......	......	......	......	......	......	945
Beury	......	......	475	415	890	890	......	......	......	......	......	......	......	890
Beurytown	......	......	(?)	(?)	435	435	955	......	......	955	......	......	......	1390
Bishop—0.6 mi. N.W	......	238	57	......	295	295	......	......	......	......	......	......	......	295
Boggs Knob—Sims Station	......	......	410	225	635	635	455	......	......	455	......	......	......	1090
Boomer	......	1140	......	......	1140	1140	......	......	......	......	......	......	......	1140
Boomer—¾ mi. E	......	716.9	......	......	716.9	716.9	......	......	......	......	......	......	......	716.9
Cannelton	215	765.2	......	......	765.2	980.2	......	......	......	......	......	......	......	980.2
Carlisle	......	600	529	......	1129	1129	......	......	......	......	......	......	......	1129
Carnifex Ferry	......	25	510	......	535	535	......	......	......	......	......	......	......	535
Cedar Grove	171	567.2	......	......	567.2	738.2	......	......	......	......	......	......	......	738.2
Columbia	8	1142.5	......	......	1142.5	1150.5	......	......	......	......	......	......	......	1150.5
Columbia—1.2 mi. S.W	......	486.1	......	......	486.1	486.1	......	......	......	......	......	......	......	486.1
Corliss—1 mi. N	......	......	(?)	(?)	810	810	......	......	......	......	......	......	......	810
Cotton Hill	......	......	500	......	500	500	......	......	......	......	......	......	......	500
Crescent	142.8	887.2	......	......	1030	1030	......	......	......	......	......	......	......	1030
Deepwater	......	441	89	......	530	530	......	......	......	......	......	......	......	530
Deepwater—½ mi. N	......	525	......	......	525	525	......	......	......	......	......	......	......	525
Deitz	......	470	160	......	630	630	......	......	......	......	......	......	......	630
Divide	......	......	350	......	350	350	......	......	......	......	......	......	......	350
Eagle—½ mi. S	120.6	......	......	......	......	120.6	......	......	......	......	......	......	......	120.6
Elk Ridge	......	468.3	......	......	468.3	468.3	......	......	......	......	......	......	......	468.3

Table Showing Thickness in Feet of Stratified Rocks in Fayette County.—(Continued).

PLACE MEASURED	PENNSYLVANIAN						MISSISSIPPIAN				DEVONIAN			Total Section
		Pottsville Series												
	Allegheny	Kanawha	New River	Pocahontas	Total Pottsville	Total Pennsylvanian	Mauch Chunk	Greenbrier Limestone	Pocono Sandstones	Total	Catskill	Chemung	Total	
Fayetteville—1.5 mi. N.W.		470.3	479.6		886.9	886.9								886.9
Gamoca		1170			1170	1170								1170
Gauley Bridge		490			490	490								490
Grandview—Royal			(?)	(?)	736.6	736.6	427			427				1163
Harewood—¼ mi. N.W.	110	1085			1085	1195								1195
Herberton (Willis Branch)		1212	509.2		1721.2	1721.2								1721.2
Horseshoe Creek, Mouth of			605		605	605								605
House Branch of Bells Creek	170	505			505	675								675
Johnson Fork, Head of		505			505	505								505
Keeferton—½ mi. W.		1095	225		1320	1320								1320
Kimberly		492			492	492								492
Kingston	90	1540	(?)	(?)	2629	2719	40			40				2759
Kingston—1.7 mi. W.		766.5			766.5	766.5								766.5
Lawton—½ mi. S.W.			(?)	(?)	530	530	70			70				600
Manns Creek, Mouth of			730	220	950	950	185			185				1135
Marting—¼ mi. S.E.		1070	(?)	(?)	1930	1930	574	1225	450	675	567		567	3746
Maywood—Aldrich Camp			(?)	(?)	833	833								833
Meadow Creek Station			(?)	(?)	735	735	225			1225				1960
Miller—Nallen			440		440	440								440
Morris Creek	205					205								205
Mt. Carbon	100.3	1114.7			1114.7	1215								1215
Mulvane—1 mi. S.W.		740			740	740								740
Nuttallburg			(?)	(?)	986	986								986
Page		1048			1048	1048								1048
Panther Mountain		980	445		1425	1425								1425
Parral (Summerlee)		610.1	553.2		1163.3	1163.3								1163.3
Peters Creek, Mouth of		455	485		940	940								940

Table Showing Thickness in Feet of Stratified Rocks in Fayette County.—(Concluded).

PLACE MEASURED	PENNSYLVANIAN						MISSISSIPPIAN				DEVONIAN			Total Section
		Pottsville Series												
	Allegheny	Kanawha	New River	Pocahontas	Total Pottsville	Total Pennsylvanian	Mauch Chunk	Greenbrier Limestone	Pocono Sandstones	Total	Catskill	Chemung	Total	
Potato Hill Knob	......	1500	460	......	1960	1960	......	......	......	......	......	......	......	1960
Powellton	100	1368	......	......	2305	2405	600	336	500	1436	439	......	439	4280
Powellton—0.5 mi. N.W.	......	1310	......	......	1310	1310	......	......	......	......	......	......	......	1310
Powellton Fork, Head of	......	267	......	......	267	267	......	......	......	......	......	......	......	267
Quinnimont—North Side	......	......	(?)	(?)	960	960	425	......	......	425	......	......	......	1385
Quinnimont—South Side	......	......	(?)	(?)	550	550	480	......	......	480	......	......	......	1030
Rader Ford, Meadow River	......	......	(?)	(?)	685	685	......	......	......	......	......	......	......	685
Ravenseye	......	......	515.2	......	515.2	515.2	......	......	......	......	......	......	......	515.2
Royal	......	......	(?)	(?)	410	410	565	......	......	565	......	......	......	975
Russellville	......	......	676.2	56.8	733	733	......	......	......	......	......	......	......	733
Schuyler Fork of Morris Creek	236.5	......	......	......	......	236.5	......	......	......	......	......	......	......	236.5
Sewell—0.9 mi. S.	......	......	(?)	(?)	865	865	105	......	......	105	......	......	......	970
Shawver Bridge	......	......	345	......	345	345	......	......	......	......	......	......	......	345
Shrewsbury	190	613	......	......	613	803	......	......	......	......	......	......	......	803
Sievy Bridge Station	......	......	(?)	(?)	630	630	70	......	......	70	......	......	......	700
Sims Schoolhouse	......	......	(?)	(?)	817	817	......	......	......	......	......	......	......	817
Smithers	......	250	......	......	250	250	......	......	......	......	......	......	......	250
South Fayette Station	......	......	(?)	(?)	992	992	......	......	......	......	......	......	......	992
Sugar Creek of Laurel	......	633	......	......	633	633	......	......	......	......	......	......	......	633
Terry	......	......	(?)	(?)	467	467	398	......	......	398	......	......	......	865
Turniphole Mountain	......	......	(?)	(?)	375	375	365	......	......	365	......	......	......	740
Turniphole Mountain—½ mi. N.W.	......	......	(?)	(?)	311	311	......	......	......	......	......	......	......	311
Vanetta	......	487	205	......	692	692	......	......	......	......	......	......	......	692
Walnut Flat Schoolhouse	......	......	(?)	(?)	521	621	......	......	......	......	......	......	......	521
Winifrede Junction	146	629	......	......	775	......	......	......	......	......	......	......	......	775
Winona	......	......	440	......	440	440	......	......	......	......	......	......	......	440
Wyndal—½ mi. S.E.	......	1075	......	......	1075	1075	......	......	......	......	......	......	......	1075

CHAPTER V.

STRATIGRAPHY—ALLEGHENY SERIES.

GENERAL DESCRIPTION.

The Allegheny Series of the Pennsylvanian, so named by the First Geological Survey of Pennsylvania from the river in the western part of the latter State, along which its members outcrop, is present over a considerable area of Fayette high up near the ridge summits, and, as exhibited on Map II, its areal extent is confined to the northwestern half of the County in Falls, Kanawha, and Mountain Cove Districts. At the beginning of Chapter IV, pages 98-9, is given a general section of the series as represented in the immediately adjoining portion of southern Clay County. In the territory of this Report, only the basal two-thirds of the formation is present, the upper portion having been eroded. When fully represented it extends from the base of the Uffington Shale of the Conemaugh down through the rock column to the Homewood Sandstone or top member of the Kanawha Group of the Pottsville Series, and in this region of the State has a total thickness of 325 to 350 feet, consisting of several sandstone ledges, alternating with buff to dark-gray sandy shales, fire clay shale, thin iron ore lenses, limestones of scanty occurrence, and three to four minable coal beds.

DESCRIPTION OF MEMBERS, ALLEGHENY SERIES.

Referring to the section mentioned above, the members in the basal two-thirds, which have been definitely recognized in Fayette, will now be described in descending order.

PLATE VIII(a).—Typical scenery along New River, looking southeast from C. & O. Railroad bridge at Hawks Nest, white cliffs in background are Lower Nuttall Sandstone.

PLATE VIII(b).—One of many picturesque views in Fayette, looking towards Newlyn from west valley wall of New River, showing topography of New River Group and Lower Nuttall Sandstone cliffs near sky-line.

THE UPPER KITTANNING COAL.

The Upper Kittanning Coal, named by Messrs. White, Platt, and Lesley from its occurrence near Kittanning, Pennsylvania, and belonging there just below the upper division of the Lower Freeport Sandstone and directly above the Upper East Lynn Sandstone, was observed at only three exposures in Fayette, one of which is exhibited in the House Branch of Bells Creek Section, page 136. In the region of its occurrence its crop belongs so high up near the ridge summits in a forested locality and its areal extent is so limited that little prospecting has ever been done to determine its worth. At **Coal Exposure No. 226 on Map II,** in the road at the schoolhouse on the divide between Smithers Creek and House Branch of Bells Creek, Teets reports this bed only 2 feet in thickness at an elevation of 1572′ L., 60 feet above the crop of the Middle Kittanning (North Coalburg) Coal and 220 feet above the Kanawha Black Flint. The Upper Kittanning Coal is only 15 inches in thickness on the south hillside of the Kanawha River, 1 mile southeast of Montgomery, as exhibited in the Crescent Section, page 144. These are the only exposures of this bed observed but its bench, concealed by debris and talus from a few feet of overlying beds, was seen at several points barely under the ridge summits. Although a valuable bed northeastward in Clay County where it was once mined commercially at Queen Shoals[1], the foregoing data are too meager to class it as a minable seam in the territory of this Report.

THE UPPER EAST LYNN SANDSTONE.

The Upper East Lynn Sandstone of the author[2], belonging in the interval separating the bed last described from the underlying Middle Kittanning (North Coalburg) Coal, is very persistent and always present directly above the crop of the latter bed. It is generally massive, pebbly and grayish-white to brown in color, and frequently forms considerable escarpments around the hillsides. Its thickness and stratigraphic position are exhibited in the special sections given in Chapter IV for Winifrede Junction, Shrewsbury, Cedar Grove, Cannelton, Harewood—¼ Mile Northwest, Crescent, Morris Creek, Schuyler Fork, and Eagle—½ Mile South. Its outcrop follows closely the same regions as that outlined on Map II for the No. 5 Block Coal, as it belongs only 75 to 100 feet above the latter bed. Frequently it lies unconformably upon the East Lynn Sandstone, the intervening Middle Kittanning ("North Coalburg") Coal and its associated roof and pavement shales having been cut away entirely. While not so conglomeratic as in southern Clay County, yet it so preserves its massive, coarse and pebbly character as to constitute an important "key-rock" when used in conjunction with the Kanawha Black Flint, 160 to 175 feet lower in the measures.

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[1] Ray V. Hennen, Braxton Clay Report, W. Va. Geol. Survey, pp. 559 and 596-9; 1917.

[2] Loc. cit., pp. 237-240.

THE MIDDLE KITTANNING ("NORTH COALBURG") COAL.

The Middle Kittanning Coal, first named and described by Messrs. Platt and Chance of the Pennsylvania Geological Survey from its occurrence between the Upper and Lower Kittanning Coal beds in western Pennsylvania, attains minable dimensions and purity in the western portions of Falls and Kanawha Districts where it is generally multiple-bedded, ranging in thickness from 4 to 10 feet, carrying both gas and splint types of coal, and belonging in the interval between the ledge last described and the underlying East Lynn Sandstone. Its outcrop follows closely the same region as that outlined on Map II for the No. 5 Block Coal, as it belongs only 60 to 90 feet above the latter bed. As mentioned by the author on pages 607-8 of the Report for Braxton and Clay Counties for the State Geological Survey, it is the same as the **North Coalburg Coal,** correlating with the highest bed in the North Coalburg (Shrewsbury) Section, published by I. C. White on page 300 of Volume II, where it is shown to belong 90 feet above the No. 5 Block Coal and 165 feet above the base of the Kanawha Black Flint. Its thickness and stratigraphic position are exhibited in the special sections given in Chapter IV for Winifrede Junction, Shrewsbury, Cedar Grove, Cannelton, Harewood—¼ Mile Northwest, House Branch of Bells Creek, Crescent, and Eagle—½ Mile South. It is this coal that is now being mined commercially at **Coal Mine No. I on Map II,** on the west hillside of the Kanawha River at Crescent by W. R. Johnson, where it belongs just 60 feet above the No. 5 Block bed at an old abandoned commercial mine in the latter coal and is known locally as the **"No. 6 Block".** It has also been prospected considerably in the northwest portion of Falls District where it attains a fine development. Its thickness and character at these diggings and other portions of the county and its approximate minable area, as limited on Figure 5, are described on subsequent pages in Chapter XI, along with an estimate of its available tonnage.

THE EAST LYNN SANDSTONE.

The East Lynn Sandstone of Krebs[3] was named from the town of East Lynn, Wayne County, belonging there 2 to 5 feet above what appears to be the No. 5 Block Coal and in the interval separating the latter from the overlying Upper Kittanning Coal and frequently attains a thickness of 100 feet. On the waters of the Kanawha River in southern Clay and western Fayette Counties, this sandstone, as originally described by Krebs, is separated into two distinct ledges by the Middle Kittanning (North Coalburg) Coal. On page 242 of the Report for Braxton and Clay Counties, the author designated the upper ledge as the **Upper East Lynn Sandstone** as mentioned on a preceding page of this Chapter, and limited the **East Lynn** name proper to the lower member, assuming that the No. 5 Block Coal had been accurately identified in the East Lynn region by Krebs. The East Lynn Sandstone, as thus limited in Fayette, is massive to current-bedded, medium-grained, seldom pebbly, highly siliceous, grayish-white in color, ranging in thickness from 60 to 90 feet. It usually forms steep slopes or great cliffs along its outcrop which follows closely the same region as that outlined on Map II for the No. 5 Block Coal. Its thickness and stratigraphic position are exhibited in the special sections given in Chapter IV for Winifrede Junction, Shrewsbury, Cedar Grove, Cannelton, Harewood—¼ Mile Northwest, Belva—1 Mile Northeast, in Falls District; and for Crescent, Morris Creek, Eagle—½ Mile South, Mt. Carbon, and Powellton, in Kanawha District.

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[3] C. E. Krebs, Cabell-Wayne-Lincoln Report, W. Va. Geol. Survey, pp. 183-4; 1913.

No quarries were observed on either this ledge or the Upper East Lynn in Fayette County, but their highly siliceous nature and wide exposure in cliffs should furnish an abundant and accessible supply of material suitable for concrete aggregate in all forms of construction work.

THE NO. 5 BLOCK (LOWER KITTANNING) COAL.

The No. 5 Block Coal of White[4], belonging at its type locality—Montgomery and Crescent, Fayette County—is a very important bed in this area, and apparently correlates with the **Lower Kittanning** of Lesley of the First Geological Survey of Pennsylvania. It is generally multiple-bedded, carrying both gas and splint types of coal, the latter predominating. Coming from the mines in both large and small blocks and standing shipment well, it has acquired an excellent reputation as a general steam and domestic fuel. The name **"No. 5 Block"** is given precedence in this Report, since its position in the measures south of Elk River in Clay County is fixed by its interval—60 to 100 feet—above the Kanawha Black Flint, while there is a remote possibility that the bed which has been described above as the **Middle Kittanning Coal** may prove to be the Lower Kittanning, in which event the No. 5 Block Coal would correlate with the Clarion of the Allegheny Series of the northern region of the State. The results of the field investigations of Reger during the field seasons of 1916 and 1917, gathering data for Detailed Reports of Webster and Nicholas Counties, tend to confirm the author's correlation of the No. 5 Block with the Lower Kittanning both in this Report and in that for Braxton and Clay Counties, pages 245-6.

Its thickness and stratigraphic position are exhibited in the special sections given in Chapter IV for Winifrede Junction, Shrewsbury, Cedar Grove, Cannelton, Harewood—¼ Mile Northwest, Crescent, Morris Creek, Schuyler Fork, Eagle —½ Mile South, Mt. Carbon, Powellton, Kingston, and

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[4] I. C. White, Vol. II(A), W. Va. Geol. Survey, pp. 525-8; 1908.

Ansted. Its detailed outcrop is shown on Map II, where it is practically the division line between the Allegheny Series and the Kanawha Group of the Pottsville. It is mined commercially on an extensive scale in the northwestern corner of Kanawha District on the south hillside of the Kanawha River and on Morris and Armstrong Creeks. Its thickness and character at these mines and other exposures, and its approximate minable area, as limited on Figure 6, are described on subsequent pages in Chapter XI, along with an estimate of its available tonnage.

The **Kittanning Sandstone** and **Clarion Coal** of western Pennsylvania, belonging at the base of the Allegheny Series, were not observed in the territory of this Report, although present in southern Clay County, as shown by the author on pages 247-8 and 681-8 of the Braxton Clay Report. In Fayette the No. 5 Block Coal, as identified in the latter Report, is apparently the basal member of the last-mentioned series.

CHAPTER VI.

STRATIGRAPHY—THE KANAWHA GROUP OF THE POTTSVILLE SERIES.

GENERAL ACCOUNT.

The Kanawha Group or Upper Pottsville of White[1], beginning at top with the Homewood or Roaring Creek Sandstone and extending down through the rock column to the top of the great Nuttall (Upper Nuttall) Sandstone of the Kanawha Valley, has its greatest development in the Herberton region of Fayette, attaining here, as may be determined from the Table of Intervals for the Sewell Coal, published in Chapter III, page 89, a total thickness of 1820 feet, as against 2100 feet in the region of its maximum development for the State in southern McDowell County. The General Section of the Pottsville Series, published at the beginning of Chapter IV, pages 100-111, includes the Kanawha Group in its maximum development for West Virginia, and, as mentioned on the pages immediately preceding the section, corrects an error in the general section of the same measures as published on pages 51-60 of the Wyoming-McDowell Report, in that the last-mentioned group should extend down to the top of the Panther (Upper Nuttall) Sandstone, or 270 feet lower in the measures and the thickness of the New River Group correspondingly reduced. At Montgomery in the northwestern edge of Fayette, the Kanawha Group has a total thickness of only 1200 feet, thus giving an expansion of over 600 feet to the southeastward in an air-line distance of 20 miles to Herberton, or at the rate of about 30 feet to the mile. Its strata consist of sandstones, medium- to coarse-grained, gray to grayish-brown or dove-colored, the latter prevailing in the lower half; coal beds, generally hard and carrying both gas and splint types in the upper two-thirds of the group, and soft and columnar in the lower third; impure fire clay shales in association with the coal beds; shale, both argillaceous and arenaceous, buff, gray, and black in color; and several impure limestones, some of which carry marine fossils and others brackish-water forms. Sandstones constitute by far the greater bulk of the strata, but the coal beds constitute the principal economic values, the formation holding 14 minable seams in addition to about an equal number of doubtful worth. The areal extent of its outcropping strata is shown in detail on Map II, the same being practically confined to the northwestern two-thirds of the County. These create a topography very similar to that prevailing for the same measures in other portions of the State, in that the valley walls along drainage channels are high, steep, and rugged, broken frequently by narrow flat benches usually holding deposits of coal and shale that separate the heavy sandstone ledges forming the steeper escarpments.

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[1] I. C. White, Vol. II(A), W. Va. Geol. Survey, p. 13; 1908.

In addition to the general section of the Kanawha, mentioned above, there is also published in Chapter IV a large number of special sections showing the rock succession of this group at scattered points throughout their occurrence, a summary of which is published at the end of the last-mentioned Chapter, pages 221-223.

DESCRIPTION OF MEMBERS, KANAWHA GROUP.

A detailed description of the members of the Kanawha Group that were definitely recognized in Fayette will now be given in descending order of their succession as exhibited in the General Section, pages 100-6.

THE HOMEWOOD (ROARING CREEK) SANDSTONE.

The Homewood Sandstone of the Pennsylvania Survey or "Roaring Creek" of White[2], the youngest or highest member of the Kanawha Group, attains practically the same development here as in other portions of the State, ranging in thickness from 50 to 100 feet. It is generally massive to current-bedded, medium- to coarse-grained, seldom pebbly, grayish-white in color, forming cliffs and steep slopes along its outcrop, the latter following closely the same region as that shown on Map II for the No. 5 Block Coal bed. Its thickness and relative position in the measures are exhibited in the special sections given in Chapter IV. No quarries were observed on it within the County, but it is very similar in physical appearance and texture to the East Lynn Sandstone and should be adapted to practically the same uses as described for the latter ledge on a preceding page of this Chapter, its wide exposures in accessible cliffs furnishing an inexhaustible supply of raw stone.

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[2] I. C. White, Vol. II(A), W. Va. Geol. Survey, pp. 488-9; 1908.

THE STOCKTON "A" (UPPER MERCER ?) COAL.

The Stockton "A" Coal of the author[3], belonging immediately at the base of the sandstone last described, 0 to 30 feet above the Kanawha Black Flint and 10 to 40 feet above the Stockton Coal, attains a fair development locally in the Eagle region. It is usually hard and splinty, ranging in thickness from 0 to 4 feet, and it apparently correlates with the **Upper Mercer Coal** of western Pennsylvania. Its thickness and stratigraphic position are exhibited in the sections given in Chapter IV for Boomer—¾ Mile East, Powellton, and Kingston, pages 126, 158, and 166, respectively. Its correlation in the latter section, however, is not so definitely determined as at the other two points, owing to the absence of the Kanawha Black Flint.

In the northwestern corner of Kanawha District, the data for the two following openings on it were obtained by the author, the first being 55 feet below the No. 5 Block Coal bed at Mine No. 8 on Map II:

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[3] Ray V. Hennen, Braxton-Clay Report, W. Va. Geol. Survey, pp. 253-5; 1917.

Coal Opening—No. 227 on Map II.

Southwest side, Kanawha River, 0.4 mile south of Eagle railway station; elevation, 1660′ B.

	Ft.	In.
Sandstone, **Homewood**, roof	..	..
Shale, gray, soft	0	1
Coal, gas, hard... 0′ 10″		
Bone .... 0 1 } **Stockton "A"**	3	8
Coal, splint, hard 2 9		
Kanawha Black Flint, typical	5	0

Coal Opening—No. 228 on Map II.

Located on point on west hillside of Schuyler Fork, 0.7 mile S. 80° W. of Eagle; section by E. Forbes, Foreman for the St. Clair Coal and Mining Co., at Mine No. 8 on Map II; elevation, 1560′ B.

	Ft.	In.
Sandstone, **Homewood**, roof	..	..
Shale, 8″ to	0	10
Coal, splint, hard, **Stockton "A"**	4	0
Shale	1	0
Kanawha Black Flint	5	0

Away from the locality of these two openings, this bed appears to be so irregular and lenticular in its deposition that it has not been classed as minable in summing up the available coal resources of the area.

THE KANAWHA BLACK FLINT.

The Kanawha Black Flint of Rogers[4] and White[5] is present at its proper horizon, 60 to 100 feet below the top of the Kanawha Group, in Fayette County, largely in its cherty phase of development, typical along the Kanawha Valley in Kanawha County. When approaching its stratified sandy phase, it is found to carry marine fossils in abundance, this taken together with its position in the measures leads the author to believe that it correlates with the **Lower Mercer Limestone** of western Pennsylvania. In the reference last cited Dr. White gives the following suggestion on page 329 as to its probable origin:

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[4] W. B. Rogers, Fifth Annual Geol. Report of Virginia; 1839

[5] I. C. White, Bull. 65, U. S. Geol. Survey, p. 98, 1891; and Vol. II, W. Va. Geol. Survey, pp. 328-331; 1903.

> "This fact (its being marine fossiliferous) has an important bearing upon the origin of the flint deposit, whether it is an original accumulation of siliceous matter like the flint in chalk, from the siliceous skeletons of diatoms and other minute forms of life, or whether the silica is derived by solution from the overlying sandstones, and has invaded the horizon from above by a kind of chemical replacement. The latter theory appears the more plausible from the facts already at hand, although it is possible that both agencies may have operated to produce the flint in question."

It ranges in thickness from 5 to 10 feet and usually strews the hillsides and drainage channels below its outcrop with rudely rectangular blocks two to six inches in thickness and width and 8 to 12 inches in length, these being bluish-black in color and practically insoluble under ordinary atmospheric conditions. Southward from the head of Armstrong Creek on to the waters of Paint Creek no exposures of flint at this horizon were observed by either Mr. Teets or the author, and it is doubtful if this phase of its occurrence is represented southwestward from the head of the former stream. Its thickness and stratigraphic position are exhibited in the special sections published in Chapter IV for Winifrede Junction, Shrewsbury, Cedar Grove, Cannelton, Marting—¾ Mile Southeast, Harewood, Boomer, Gamoca, Wyndal, House Branch of Bells Creek, and Belva in Falls District; for Crescent, Mt. Carbon, Columbia, and Powellton in Kanawha; and for Ansted in Mountain Cove. Its outcrop belongs slightly above midway between that detailed on Map II for the No. 5 Block and Coalburg Coal beds.

For a list of the species of marine fossil fauna thus far reported from the Kanawha Black Flint by Price, the reader is referred to the table at the end of this Chapter.

THE STOCKTON (LOWER MERCER?) COAL.

The Stockton Coal of White[6], belonging at its type locality—Cannelton, Kanawha County—immediately below the last stratum described and so named from Aaron Stockton who once mined it at the latter place, is fairly persistent in Fayette, attaining sufficient economic importance to be classed as a minable seam. It is always multiple-bedded and carries both gas and splint types of coal, the latter predominating and usually occupying the basal portion of the bed. Its position in the Pottsville Series and its intimate association below the Kanawha Black Flint, which, as mentioned above, appears to represent the Lower Mercer Limestone of western Pennsylvania, tend to the most probable conclusion that it correlates with the **Lower Mercer Coal** of the same region of the latter State. This is further corroborated by D. B. Reger of the Survey Staff, who, in a verbal communication, reports the Kanawha Black Flint as belonging between the Upper Mercer and Lower Mercer Coal beds, near Hemlock in southern Upshur County, the farthest point northeastward from the Kanawha Valley region that the "Flint" horizon with characteristic marine fossils has been definitely identified. In the territory of this Report, the thickness and stratigraphic position of the coal are exhibited in the sections for Winifrede Junction, Shrewsbury, Cannelton, Harewood, Boomer, and House Branch of Bells Creek in Falls District; for Crescent, Mt. Carbon, Powellton, Page, and Kingston in Kanawha; for Ansted in Mountain Cove, and for Potato Hill Knob in Fayetteville. It is not being mined commercially in the County, but it has been prospected to some extent. Its character at these diggings and crop exposures is described on subsequent pages in Chapter XI, along with Figure 7, showing its approximate minable area, and an estimate of its available tonnage.

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[6] I. C. White, Vol. II, W. Va. Geol. Survey, p. 538; 1903.

THE UPPER COALBURG SANDSTONE.

The Coalburg Sandstone of White[7] or the Upper Coalburg Sandstone of the author[8] and Reger, belonging in the interval separating the coal last described from the underlying Coalburg bed, is very persistent, ranging in thickness from 25 to 75 feet. It is very similar in physical appearance and texture to the overlying Homewood and East Lynn ledges previously described, and frequently weathers into "toadstool forms" and "table-rocks," especially where exposed on points and ridges. It is always a prominent feature in the topography of Fayette, forming either prominent cliffs or steep slopes along its outcrop, the latter following closely the same region as that outlined on Map II for the immediately underlying Coalburg Coal. Its thickness and stratigraphic position are shown in the special sections published in Chapter IV for Falls, Kanawha, Mountain Cove, and Fayetteville Districts. No quarries were observed on it but it should be adapted to the same uses as prescribed on a preceding page of this Chapter for the East Lynn Sandstone, its wider exposures at a lower elevation furnishing a correspondingly greater supply of raw stone.

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[7] I. C. White, Vol. II(A), W. Va. Geol. Survey, p. 468; 1908.

[8] Ray V. Hennen, Logan-Mingo Report, W. Va. Geol. Survey, pp. 137-8; 1914.

THE COALBURG COAL.

The Coalburg Coal of White[9], belonging at its type locality—Coalburg, Kanawha County—60 to 100 feet below the Kanawha Black Flint, is very persistent and is mined extensively on a commercial scale in Falls District on Gauley River. It is always multiple-bedded and, like the Stockton, carries both gas and splint types of coal, the latter usually predominating, its interval below the Stockton being practically the same as for its type locality mentioned above. Its detailed outcrop is shown on Map II, and its thickness and stratigraphic position are exhibited in the special sections published in Chapter IV for Winifrede Junction, Shrewsbury, Cannelton, Boomer, Gamoca, Wyndal, House Branch of Bells Creek, and Panther Mountain for the Falls District region; Powellton, Page, and Kingston in Kanawha District; Ansted in Mountain Cove; and Potato Hill Knob in Fayetteville. On the basis that the Stockton represents the Lower Mercer, it is evident that this bed belongs in the Connoquenessing Sandstone Stage of the Pottsville Series of western Pennsylvania, the **Upper Coalburg Sandstone** being the highest member of that stage as represented in the Kanawha Valley. Reger[10] tentatively correlates this bed with the **Quakertown Coal** of the northern portion of the State, but the author is inclined to believe that the latter is represented in the Kanawha Valley by the Campbell Creek as shown in the following section measured by Reger and the author and published on pages 97-9 of the Preston County Report for the State Geological Survey, with some additions and slight changes in correlation resulting from a recent trip by Reger, Price, and the author to this locality in the prosecution of a successful search for a fossil fauna in these exposures along the Baltimore & Ohio Railroad west of Rowlesburg. The author believes that the coal and the shale 457 and 469 feet from the top, respectively, represent the Eagle Coal and the marine fossiliferous Eagle Limestone and Shale of the Kanawha Valley, and, as the Campbell Creek Coal is very persistent northeastward from the latter region across Nicholas County into Webster, the Quakertown would appear to be its representative in the section. The Eagle Coal at its type locality in Fayette is usually soft and columnar in structure with 4 to 6 inches of bony or slaty coal at the top, features that are duplicated by the be correlated as the Eagle in the section below, the correlation being further strengthened by the intimate association of the marine fossil horizon (Eagle Shale) below it:

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[9] I. C. White, Bull. 65, U. S. Geol. Survey, p. 162; 1891; and Vol. II, W. Va. Geol. Survey, pp. 548-556; 1903.

[10] D. B. Reger, Barbour-Upshur-W. Randolph Report, W. Va. Geol. Survey, p. 274; 1918.

Rowlesburg (Preston County) Section.

			Thickness. Feet.	Total. Feet.
Allegheny Series (241')				
Coal, bony	0' 10"	Upper Freeport Coal	6	6
Coal, soft	2 0			
Slate, gray	0 3			
Coal, bony	1 10			
Slate, black	0 1			
Coal, 10" to	1 0			
Fire clay			1	7
Sandstone and shale			16	23
Shale, green and sandy			5	28
Limestone, gray and hard	1' 6"	Upper Freeport Limestone	14.5	42.5
Shale, gray, limy, with iron ore nodules	6 0			
Limestone, gray and hard, siliceous, with shale layers	7 0			
Fire clay shale			4	46.5
Fire clay, flinty, (Lower Freeport Coal horizon)			8	54.5
Fire clay with dark shale at top			5	59.5
Sandstone, limy and shaly			2	61.5

		Thickness. Feet.	Total. Feet.	
Sandstone, massive		3	64.5	
Shale, gray		4	68.5	
Concealed		52.5	121	
Sandstone		2	123	
Concealed		1	124	
Shale, gray		5.2	129.2	
Coal	0′ 3″			
Shale, gray	0 5			
Coal	0 6 } **Upper Kittanning**	2.7	131.9	131.9′
Shale, gray	1 2			
Coal	0 4			
Concealed		51.1	183	
Fire clay, plastic		15	198	
Fire clay, with nodules of ferriferous limestone (**Lower Kittanning**)		7	205	
Sandstone, shaly, **Lower Kittanning**		3	208	
Shale, siliceous		1	209	
Limestone, Vanport, siliceous, ferriferous		1	210	78.1′
Shale, brown, siliceous		4.7	214.7	
Sandstone, flaggy		0.3	215	
Coal, Upper Clarion		1	216	
Shale, dark-gray		8	224	
Sandstone, flaggy, slaty, finely laminated		7	231	
Coal, good	1′ 1″			
Slate, black	0 1½			
Coal	0 7			
Shale, gray	2 5½ **Lower Clarion Coal**	10	241	31′
Coal, bony	0 2			
Shale, gray	2 5			
Coal, bony	1 7			
Coaly slate, hard	1 7			
Pottsville Series, Kanawha Group (239′)				
Sandstone, **Homewood**, massive, white		28	269	
Shale, dark, siliceous		5	274	
Fire clay, indurated, with plant fossils		1	275	
Coal	0′ 2″			
Shale, dark	3 1 } **Tionesta Coal**	4	279	
Coal	0 9			
Shale, dark		3	282	
Sandstone, massive, dark-gray, medium-grained, micaceous		34	316	
Shale, black, with iron ore nodules and thin ferriferous limestone		7.2	323.2	
Coal, Upper Mercer, (Stockton "A")		0.8	324	83′
Shale, black, laminated		5	329	
Shale, siliceous		21	350	
Sandstone, massive		2	352	
Shale, black, finely laminated, **Kanawha Black Flint horizon?**		2.5	354.5	
Coal, slaty	0′ 3″ (10″) **Lower Mercer**			
Slate, black	0 2 } **(Stockton)**	1	355.5	31.5′
Coal, good	0 5			
Shale		3.5	359	
Sandstone, Upper Connoquenessing, massive, gray and coarse		78	437	

	Thickness. Feet.	Total. Feet.	
Coal .... 0′ 3″ **Quakertown**			
Shale, soft, brown 4 7 **(Campbell Creek?)**	5.7	442.7	87.2′
Coal 0 7			
Shale, green, brown, and siliceous.........	7.3	450	
Limestone, Stockton, ferriferous...........	1	451	
Shale, dark, siliceous, finely laminated.....	6	457	
Coal, bony........ 0′ 5″			
Eagle	2	459	16.3′
Coal, soft, columnar 1 7			
Shale, gray, laminated......................	10	469	
Shale, Eagle Limstone horizon, siliceous, with many small iron ore nodules and fossil fauna, **Deltopecten flabellum, Naiadites elongata,** and **Lingula**..................	10.7	479.7	
Coal, soft, **Gilbert**........................	0.3	480	21′
Pottsville Series, New River Group (91′)			
Shale, siliceous, yellow and brown.........	6	486	
Shale, dark, siliceous, finely laminated.....	3	489	
Limestone, very siliceous..................	2	491	
Shale, green, siliceous....................	3	494	
Slate, black, cannelly......................	0.8	494.8	
Shale, dark-green, finely laminated........	4.2	499	
Slate, Hartridge?, black, siliceous, finely laminated, with fossil fauna of genus **Lingula**	5.6	504.6	
Coal, Sharon (Sewell?), soft, columnar....	0.4	505	25′
Shale, dark, siliceous, finely laminated, with iron ore nodules........................	15	520	
Sandstone, Sharon (Upper and Lower Raleigh), massive, white and brown, conglomeratic, quartz pebbles, with 5 feet of shale near middle, to top of **Mauch Chunk Series** of red shale and sandstone.......	51	571	65′

The above section, of course, does not show the Coalburg Coal which is no doubt an extra bed interpolated between separate members of the Upper Connoquenessing Sandstone as the latter undergoes enormous expansion southwestward to Fayette County from the Rowlesburg region.

The thickness and character of the Coalburg Coal at the several commercial mines and other exposures are described on subsequent pages in Chapter XI, along with Figure 8 showing its approximate minable area and an estimate of its available tonnage.

THE LITTLE COALBURG COAL.

The Little Coalburg Coal of Reger and the author[11], originally described as a split off the Coalburg bed proper, does not attain economic importance in Fayette, but it is noted in the sections for Cedar Grove, Kingston, and Potato Hill Knob, pages 118, 166, and 190, respectively.

THE LOWER COALBURG SANDSTONE.

The Lower Coalburg Sandstone of Reger and the author[12], belonging immediately below the coal last described, was definitely recognized near Powellton, its thickness and stratigraphic position there being shown in the section given for the latter place in Chapter IV, page 158.

The **Buffalo Creek Coal** and the marine fossiliferous **Buffalo Creek Limestone** of Reger and the author[12a], belonging directly below the ledge last described at their type locality—Buffalo Creek, Mingo County—were not observed in Fayette. A further discussion of these two members, as regards their correlation in Mingo County, is given on subsequent pages of this Chapter under the description of the Winifrede Limestone. Price recently visited the Buffalo Creek region of the latter area and succeeded in locating the Buffalo Creek Limestone at practically the same interval below the Buffalo Creek Coal as it is shown by the author in the Rawl Section of the Logan-Mingo Report, pages 77-9. A list of the species of the fossil fauna that he collected on this visit is given in the table at the end of this Chapter.

THE UPPER WINIFREDE SANDSTONE.

The Upper Winifrede Sandstone of White[13], belonging in the Kanawha Valley immediately above the Winifrede Coal, is widely persistent in Fayette, ranging in thickness from 25 to 100 feet. It is very similar in physical appearance and texture to the Upper Coalburg ledge, described on a preceding page of this Chapter, and is usually a prominent feature in the topography, forming cliffs and steep slopes along its outcrop, the latter following roughly the same region as that outlined on Map II for the Coalburg Coal bed, as it belongs only 30 to 50 feet below the latter seam. Its thickness and stratigraphic position are exhibited in the special sections published in Chapter IV for Shrewsbury, Cannelton, Gamoca, and Belva—0.7 Mile South in Falls District; Panther Mountain in Nicholas County; Crescent, Powellton, and Kingston in Kanawha District; and Potato Hill Knob in Fayetteville District. No quarries were observed on it, but this ledge should be adapted to practically the same economic uses as prescribed for the East Lyinn ledge.

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[11] Ray V. Hennen and D. B. Reger, Logan-Mingo Report, W. Va. Geol. Survey, pp. 140-1; 1914.

[12] Loc. cit.

[12a] Loc. cit., pp. 142-3.

[13] I. C. White, Vol. II(A), W. Va. Geol. Survey, p. 271; 1908.

THE WINIFREDE COAL.

The Winifrede Coal of White[14], belonging at its type locality, near Winifrede in Kanawha County, 175 to 200 feet below the Kanawha Black Flint and 70 to 100 feet below the Coalburg Coal, is fairly persistent in Fayette and usually occupies the same relative position below the two members mentioned. It is usually multiple-bedded and carries both gas and splint types of coal, the latter predominating. It has never been mined commercially in the County, but its thickness and stratigraphic position are given in the sections published in Chapter IV for Winifrede Junction, Shrewsbury, Cedar Grove, Cannelton, Boomer—¾ Mile East, and Wyndal in Falls District; Powellton, Page and Kingston in Kanawha; and Potato Hill Knob in Fayetteville. These show it ranging from a few inches to over 5 feet in thickness. Its bed section appears to be somewhat irregular but it is believed to attain sufficient thickness and purity to warrant its classification as a minable bed, this being especially true as the thicker and more regular seams begin to approach exhaustion as a result of mining operations. A further description of it will be given on subsequent pages in Chapter XI, along with Figure 9, showing its approximate minable area, as also an estimate of its available tonnage.

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[14] I. C. White, Bull. 65, U. S. Geol. Survey, p. 162; 1891; and Vol. II, W. Va. Geol. Survey, p. 556; 1903.

THE LOWER WINIFREDE COAL.

The Lower Winifrede Coal of Krebs[15], belonging in Raleigh County, 6 to 50 feet below the bed last described, does not appear to attain economic importance in the territory of this Report, although it is shown in the special sections given in Chapter IV for Cannelton and Kingston, pages 119 and 166, respectively.

THE LOWER WINIFREDE SANDSTONE.

The Lower Winifrede Sandstone of White[16], belonging in the Kanawha Valley immediately below the bed last described, attains practically the same development in Fayette as the Upper Winifrede ledge which it resembles both in texture and physical appearance. Its thickness and stratigraphic position are exhibited in the special sections given in Chapter IV for Winifrede Junction, Shrewsbury, Cedar Grove, Cannelton, Belva—0.7 Mile South, and House Branch of Bells Creek in Falls District; Mt. Carbon and Powellton in Kanawha; and Potato Hill Knob in Fayetteville District. No quarries were observed on it but its wide exposures in cliffs should furnish an abundance of raw stone suitable for concrete aggregate.

THE CHILTON "A" COAL.

The Chilton "A" Coal of Reger and the author[17], belonging at its type locality in Logan County about midway between the Winifrede and Chilton Coal beds, is of minor importance in Fayette, the only point it is recorded being in the Kingston region as shown in the section in Chapter IV, for the latter place, page 166.

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[15] C. E. Krebs, Raleigh Co. Report, W. Va. Geol. Survey, p. 339; 1916.

[16] I. C. White, Vol. II(A), W. Va. Geol. Survey, p. 271; 1908.

[17] Ray V. Hennen and D. B. Reger, Logan-Mingo Report, W. Va. Geol. Survey, pp. 146-7; 1914.

THE WINIFREDE LIMESTONE.

The marine fossiliferous Winifrede Limestone of White[18], belonging at its type locality—near Winifrede, Kanawha County, 65 to 70 feet below the Wniifrede Coal and 20 to 30 feet above the Chilton Coal, is usually represented by 5 to 10 feet of dark-gray argillaceous shale, with marine fossils in profusion, those of the genus **Productus** predominating as at Winifrede. Its stratigraphic position is shown in the special sections given in Chapter IV for Cannelton and Potato Hill Knob, pages 119 and 190, respectively, the only localities it was observed. The latter section shows it belonging directly over the Upper Chilton Sandstone instead of immediately at the base of this ledge as tentatively placed by the author on pages 52 and 141 of the Wyoming-McDowell Report. It is possible that this marine horizon may represent the **Buffalo Creek Limestone** of Mingo County as shown by Reger and the author on pages 78, 101, and 143 of the Logan-Mingo County Report. Such a correlation would make the **Buffalo Creek Coal** of the latter County—as shown specifically in the Rawl Section of the latter Report—represent the Winifrede bed of the Kanawha Valley, a feature difficult to harmonize with the accurate detailed Clothier-Beech Creek Section, published on pages 50-4 of the same Report. In the latter section the positions of the Coalburg and Chilton Coal beds are fixed, and it is to be regretted that an opportunity was not afforded to study and search the core from the diamond drill boring used in connection therewith to determine the position of the Winifrede Limestone fossils in it. Thus far only a single marine fossil horizon has been found in the State in any single exposure of the strata between the Kanawha Black Flint and the Dingess Limestone, a feature that tends to support the belief of the State Geologist, Dr. White, that the Buffalo Creek Limestone represents the Winifrede ledge. This point should be definitely removed from the field of doubt as a more detailed study of the fossil fauna of the upper portion of the Kanawha Group is prosecuted and better facilities for the study of the stratigraphy in the intermediate forested region are afforded from the logs of the many diamond drill borings now being sunk and the many prospect openings being driven to test the character of the coal beds.

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[18] I. C. White, Vol. II(A), W. Va. Geol. Survey, p. 431; 1908.

For a list of the species of marine fossil fauna thus far reported by Price, the reader is referred to the table at the end of this Chapter.

THE UPPER CHILTON SANDSTONE.

The Upper Chilton Sandstone of White, Reger and the author[19], belonging in the interval separating the Lower Winifrede Sandstone and the Chilton Coal, is usually present in Fayette County, where it is massive, medium-grained, micaceous and grayish-brown in color, ranging in thickness from 40 to 85 feet and forming cliffs or steep slopes along its outcrop. Its stratigraphic position is shown in the sections given in Chapter IV for Powellton—½ mile Northwest, and Potato Hill Knob, pages 156 and 190, respectively. No quarries were observed on it and it is doubtful whether it would be suitable for concrete aggregate or for building material exposed to the weather, as it evidently carries a greater percentage of aluminous material that the ledges already described for the Kanawha Group.

THE CHILTON COAL.

The Chilton Coal of White[20], belonging at its type locality —Chilton, Kanawha County—70 feet below the Winifrede bed, attains a development that warrants its classification as a minable seam in Fayette. It is usually multiple-bedded, carrying both splint and gas types of coal but it has never been mined commercially in the County. Its thickness and stratigraphic position are exhibited in the special sections given in Chapter IV for Winifrede Junction, Cedar Grove, Cannelton, Boomer—¾ Mile East, and Wyndal in Falls District; Crescent, Powellton—½ Mile Northwest, and Page in Kanawha; Ansted in Mountain Cove; and Potato Hill Knob in Fayetteville. Its detailed outcrop is indicated on Map II. This bed usually carries a 3- to 6-inch fire clay parting near the middle, which, on Dingess and Rum Creeks and the Guyandot River in Logan County where it is mined extensively on a commercial scale, becomes a chocolate-colored flint clay. In a paper read at the St. Louis, Mo., meeting of the Geological Society of America in December, 1917, I. C. White suggests the correlation of the **Dean-Fire Clay Coal** of Crider[21] with the Chilton bed of West Virginia. The former bed in Letcher County is a very valuable "key-rock" in that it is widely persistent and always carries a 3- to 6-inch parting of chocolate-colored flint fire clay near its middle, a feature that has been observed only for the Chilton bed in the Kanawha Group of the Pottsville Series of West Virginia, as mentioned above for Logan County. Its relative position in the measures with respect to other members below it that have been definitely identified in each State, further corroborates the suggested correlation.

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[19] I. C. White, Vol. II(A), p. 271; 1908; and Ray V. Hennen and D. B. Reger, Logan-Mingo Report, W. Va. Geol. Survey, pp. 147-8; 1914.

[20] I. C. White, Vol. II(A), W. Va. Geol. Survey, p. 430; 1908.

In the Kanawha Valley the Chilton bed is evidently represented by the **"Point Coal"** in the Malden and Winifrede Junction Sections of I. C. White as published on pages 509-510 and 515, respectively, of Volume II of the State Geological Survey Reports. It is not now mined commercially in Fayette but it has been prospected to some extent. Its thickness and character at these diggings will be described on subsequent pages of Chapter XI, along with Figure 10, showing its approximate minable area, as also an estimate of its available tonnage.

The Lower Chilton Sandstone, the Little Chilton Coal and the Hernshaw Sandstone of Reger and the author[22], belonging in the interval separating the bed last described from the underlying Hernshaw Coal, are of minor importance in Fayette, but these are recorded in the special sections published in Chapter IV for Powellton, Kingston, and Powellton—½ Mile Northwest, respectively.

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[21] A. F. Crider, The Coals of Letcher County; Ky. Geol. Survey; Nov., 1917.

[22] Ray V. Hennen and D. B. Reger, Logan-Mingo Report, W. Va. Geol. Survey, pp. 150-6; 1914.

THE HERNSHAW COAL.

The Hernshaw Coal of Reger and the author[23], belonging at its type locality—Hernshaw, Kanawha County—175 feet below the Winifrede Coal, 120 feet above the Cedar Grove bed and 240 feet above the base of the No. 2 Gas Coal, and locally known as the "**Black Band**" **Coal**, although present in Fayette, appears to be too thin and irregular to warrant classification as a minable bed. It belongs 60 to 75 feet below the Chilton Coal and about 100 feet above the marine fossiliferous Dingess Limestone. Its thickness and stratigraphic position are exhibited in the special sections published in Chapter IV for Winifrede Junction, Shrewsbury, Belva—1 Mile Northeast, House Branch of Bells Creek, and Panther Mountain in the Falls District region; Columbia—1.2 Miles Southwest, Powellton—½ Mile Northwest, Page, and Kingston in Kanawha District; Ansted in Mountain Cove; and Potato Hill Knob in Fayetteville and in the logs of Coal Test Borings Nos. 1 and 6 on Map II, published in Chapter XI.

The **Naugatuck Sandstone** and the **Dingess Coal** of Reger and the author[24], belonging at their respective type localities in Mingo County in the interval separating the coal last described from the underlying Williamson Sandstone, were not recognized in Fayette County. In the light of the studies and investigations of this portion of the Kanawha Group in other regions of southern West Virginia since the completion of the field work in Mingo County in 1913, the author now believes that the bed at Dingess in the latter area, designated the Dingess Coal in the Report last cited, is one and the same with the **Williamson Coal** of the same Report and County, as corroborated by their marked resemblances in bed structure and the fact that the former has never been recognized in minable dimensions and purity away from the northwest border of Logan and Mingo Counties. The author now believes that the confusion in the correlation of these coal beds was caused by the assumption that the marine fossil horizon exposed on the north bank of Twelvepole, at an elevation of 990′ B., ¼ mile southeast of Dingess, was the same as the marine fossiliferous Dingess Limestone proper as exposed in the bed of the same stream at an elevation of 1010′ B., ¾ mile farther southeastward although this locality has not been visited since 1913. The first-mentioned exposure very probably correlates with the **Seth Limestone** which is further described on a subsequent page of this Chapter.

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[23] Loc. cit., pp. 156-163.

[24] Loc. cit., pp. 163-5.

THE WILLIAMSON SANDSTONE.

The Williamson Sandstone of Reger and the author[25], belonging at its type locality—Williamson, Mingo County—from a few inches to 10 feet above the marine fossiliferous Dingess Limestone, is generally present in Fayette. It is usually massive to flaggy, medium-grained, micaceous, and greenish-gray in color, ranging in thickness from 20 to 50 feet. Its stratigraphic position is shown in the special sections given in Chapter IV for Cedar Grove, Cannelton, and Mulvane. No quarries were observed on it.

THE DINGESS LIMESTONE.

The marine fossiliferous Dingess Limestone of Reger and the author[26], belonging at its type locality—Dingess, Mingo County—in the 10 to 40 feet of shales separating the ledge last described from the underlying Williamson Coal, was not observed within the borders of Fayette, but its true position in the measures of the Kanawha Valley was determined by the author from an exposure 6½ miles northwestward on the north hillside of the Kanawha River at Cedar Grove, 0.7 mile northwest of the mouth of Kelly Creek, its stratigraphic position here being exhibited in the section published in Chapter IV for Cedar Grove, page 118, and in another at Winifrede Junction, page 114. The former is important, in that it shows the presence of the horizon of the marine fossiliferous **Seth** Limestone, 40 to 45 feet lower in the measures in the roof shales of the Cedar Grove Coal at the type locality of the latter bed.

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[25] Ray V. Hennen and D. B. Reger, Logan-Mingo Report, W. Va. Geol. Survey, p. 165; 1914.

[26] Loc. cit.

For a list of the species of marine fossil fauna from the Dingess Limestone thus far reported by W. Armstrong Price of the State Survey Staff, the reader is referred to the table at the end of this Chapter.

THE WILLIAMSON COAL.

The Williamson Coal of Reger and the author[27], belonging at its type locality—Williamson, Mingo County—directly below the member last described and 80 to 90 feet above the Cedar Grove (Upper Thacker) Coal—is fairly persistent in Fayette, although too thin, impure, and irregular to warrant its classification as a minable bed. Its thickness and stratigraphic position are exhibited in the special sections given in Chapter IV for Shrewsbury, Cannelton, Boomer, Boomer—¾ Mile East, and Wyndal in the Falls District region; Crescent, Powellton—½ Mile Northwest, and Page in Kanawha; and Ansted in Mountain Cove; and in the log of Coal Test Boring No. 6 on Map II, the details of which are published in Chapter XI. Its outcrop should belong about midway between the regions outlined on Map II for the Chilton and No. 2 Gas beds.

THE UPPER CEDAR SANDSTONE.

The Upper Cedar Grove Sandstone of Reger and the author[28], belonging in the 50 to 100 feet of measures separating the coal last described from the underlying Cedar Grove Coal, is very persistent in Fayette, being massive, medium-grained, micaceous, and greenish-gray to dove-colored, and ranging in thickness from 30 to 90 feet. Its stratigraphic position is exhibited in the special sections published in Chapter IV for Winifrede Junction, Cedar Grove, and Belva—0.7 Mile South in the Falls District region; and for Columbia—1.2 Miles Southwest, Powellton—½ Mile Northwest, and Powellton in Kanawha; and in the log of Coal Test Boring No. 6 on Map II, details of which are found on a subsequent page in Chapter XI. No quarries were observed on it, and, like the other sandstone ledges of the Kanawha Group below the Lower Winifrede, it appears to carry too much aluminous matter to be used successfully in crushed form for concrete aggregate or for building stone on exposed surfaces.

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[27] Loc. cit., pp. 166-8.
[28] Loc. cit., pp. 169-170.

THE SETH LIMESTONE.

The marine fossiliferous Seth Limestone of Krebs[29], belonging at its type locality—Seth, Boone County—40 to 50 feet below the fossiliferous Dingess Limestone, is present in Fayette in the 10 to 15 feet of shales intervening between the ledge last described and the underlying Cedar Grove Coal, as exhibited in the special sections published in Chapter IV for Columbia—1.2 Miles Southwest, in Kanawha District; Shrewsbury and Cedar Grove in Kanawha County; and Panther Mountain in Nicholas. In the latter section its correlation is uncertain, as no marine fossils were seen by Reger at this exposure. Under the description of the Dingess Coal on a preceding page of this Chapter, the author suggests its possible occurrence near Dingess, Mingo County, at 35 to 50 feet below the Dingess ledge, reference to it being made here in order to correct a probable erroneous statement by the author on page 168 of the Logan-Mingo Report that it was not observed in either of those two Counties.

A list of the species of fossil fauna thus far reported from the Seth Limestone by W. A. Price is published in a table at the end of this Chapter.

THE CEDAR GROVE COAL.

The Cedar Grove Coal of White[30], belonging at its type locality—Cedar Grove, Kanawha County—300 feet below the Winifrede bed, 5 to 10 feet below the Seth Limestone, and 100 to 120 feet above the No. 2 Gas Coal, attains sufficient thickness, purity, and regularity in portions of Fayette to warrant its classification as a minable bed, although not now being mined commercially within the County. It is usually multiple-bedded, quite hard but not of the splinty type characteristic of the Winifrede and Coalburg seams, being rather intermediate between these and the soft coals in the basal portion of the Kanawha Group. Its thickness and stratigraphic position are exhibited in the special sections published in Chapter IV for Winifrede Junction, Shrewsbury, Cedar Grove, and Albion for the Falls District region; Mt. Carbon, Columbia—1.2 Miles Southwest, and Powellton—½ Mile Northwest in Kanawha; Ansted in Mountain Cove; and Potato Hill Knob in Fayetteville. Its outcrop follows roughly the same regions as outlined on Map II for the No. 2 Gas Coal, as it belongs only about 100 feet above the latter bed. At its type locality, mention above, it usually has about 5 feet above the main bed a 6-inch "rider"—the **Cedar Grove "Rider" Coal** of page 172 of the Logan-Mingo Report—a feature that is characteristic of the Cedar Grove Coal in the southwest border of the State, the latter bed being known locally in Logan County as the **"Island Creek" Coal** and in Mingo as the **"Upper Thacker" Coal**. It has been prospected to some extent in Fayette. Its thickness and character at these diggings, along with Figure 11, showing its approximate minable area in Fayette, and an estimate of its available tonnage are given on subsequent pages in Chapter XI.

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[29] C. E. Krebs, Boone County Report, W. Va. Geol. Survey, p. 155; 1915.

[30] I. C. White, Bull. 65, U. S. Geol. Survey, pp. 138-140; 1891; and Vol. II, W. Va. Geol. Survey, p. 562; 1903.

The **Middle Cedar Grove Sandstone** and the **Lower Cedar Grove Coal** of Reger and the author[*], both of which are the result of a "split" off the Cedar Grove Coal proper southward in Boone, Logan, Mingo, Wyoming, and McDowell, and the coal known locally in the latter three Counties as the **"Lower Thacker"**, do not appear to be represented in Fayette. Here the latter, originally representing the lower bench of the Cedar Grove proper, is separated from the upper bench by only a few inches of shale instead of by the heavy Middle Cedar Grove Sandstone.

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[*] Ray V. Hennen and D. B. Reger, Logan-Mingo Report, W. Va. Geol. Survey, pp. 170 f.; 1914.

THE PEERLESS SANDSTONE.

The Peerless Sandstone of Krebs[32], belonging at its type locality near Winifrede Junction, Kanawha County, 5 to 20 feet above the Peerless division of the Campbell Creek Coal, is widely persistent in Fayette. It is usually massive, medium-grained, micaceous, greenish-gray to bluish-gray in color, and ranges in thickness from 25 to 70 feet. It is the same as the **Lower Cedar Grove Sandstone** of Reger and the author[33], as determined by the latter while gathering data in the field for this Report during 1916, the name **Peerless** holding by right of priority. Its thickness and stratigraphic position are exhibited in the special sections published in Chapter IV and in the logs of Coal Test Borings Nos. 1 and 6 on Map II in Chapter XI.

The **Alma "A" Coal** of Reger and the author[34], belonging in Mingo County immediately at the base of the ledge last described and 10 to 20 feet above the Alma Coal, has apparently thinned away in the territory of this Report.

THE ALMA COAL.

The Alma Coal of White[35], belonging at its type locality—near Sprigg, Mingo County—120 to 140 feet below the Cedar Grove (Upper Thacker) seam and 100 to 120 feet above the Campbell Creek Coal, as determined by the author on page 177 of the Logan-Mingo Report, attains sufficient thickness, purity and regularity in portions of Fayette to warrant its classification as a minable bed. It is usually multiple-bedded, carrying both gas and splint types of coal, the former predominating. The investigations of the author along the Kanawha River Valley during 1916 show that this coal belongs in the interval separating the Peerless Sandstone from the underlying Campbell Creek Limestone, and that the former stratum belongs about 70 feet higher in the measures in Mingo County than shown by Reger and the author in the General

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[32] C. E. Krebs, Kanawha Co. Report, W. Va. Geol. Survey, p. 281; 1914.

[33] Ray V. Hennen and D. B. Reger, Logan-Mingo Report, W. Va. Geol. Survey, p. 175; 1914.

[34] Loc. cit.

[35] I. C. White, Vol. II(A), W. Va. Geol. Survey, pp. 403-7; 1908.

Section of the Pottsville Measures on page 103 of the Report last mentioned, at the horizon of the Lower Cedar Grove ledge. The thickness and stratigraphic position of the Alma Coal are exhibited in the sections published in Chapter IV for Cedar Grove, Crescent, Mt. Carbon, Columbia—1.2 Miles Southwest, Page, Kingston, Potato Hill Knob and Herberton, and in the logs of Coal Test Borings Nos. 4 and 6 on Map II in Chapter XI. As it belongs only 40 to 90 feet above the No. 2 Gas Coal, its outcrop should follow roughly the same region as that outlined for the latter bed on Map II. It is not mined commercially in this area but it is exposed at crop and has been prospected to some extent. Its thickness and character at these exposures and diggings, along with Figure 12, showing its approximate minable area, and also an estimate of its available tonnage, are published on subsequent pages in Chapter XI.

THE MONITOR SANDSTONE.

The Monitor Sandstone of the author[36] or the **"Logan"** of Reger and the author[37], belonging at its type locality—Monitor, Logan County—immediately below the coal last described and ranging in thickness from 30 to 50 feet, was definitely recognized only in the southwest portion of Fayette, its thickness and stratigraphic position, as determined by Teets, being exhibited in the Kingston Section published in Chapter IV, page 166.

The **Little Alma Coal** of Reger and the author[38], belonging immediately at the base of the ledge last described, has apparently thinned away in Fayette, as it was not observed at many exposures of its horizon.

The name **Lower Monitor Sandstone** is suggested in this Report for the ledge in Logan and Mingo that was erroneously correlated with the Peerless on pages 103 and 183 of the Report for those two Counties, attention to which is called above under the description of the Alma Coal.

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[36] Ray V. Hennen, Wyoming-McDowell Report, W. Va. Geol Survey, p. 148; 1915.

[37] Ray V. Hennen and D. B. Reger, Logan-Mingo Report, W. Va. Geol. Survey, pp. 178-180; 1914.

[38] Loc. cit., pp. 180-3.

THE CAMPBELL CREEK LIMESTONE.

The Campbell Creek Limestone of White[39], belonging at its type locality—mouth of Campbell Creek, Kanawha County —30 to 40 feet above the coal of the same name, is quite persistent in Fayette. It is generally represented by lens-shaped concretions and it has often a "cone-in-cone" structure, features that are characteristic of the limestones of the Kanawha Group throughout southern West Virginia. Its thickness and stratigraphic position are exhibited in the general section of the Kanawha Group and in the special sections published in Chapter IV for Cedar Grove, Kimberly, and Columbia—1.2 Miles Southwest, pages 118, 150, and 153, respectively. Its outcrop follows closely the same region as that outlined on Map II for the No. 2 Gas Coal. It is too thin, siliceous and irregular to be of much economic importance, only serving slightly to enrich the soil along its immediate exposures, but it serves as a valuable "key-rock" in the correlation of the adjacent members of the Kanawha Group and establishes the true position of the Alma Coal bed of Mingo County in the measures of the Kanawha Valley.

THE CAMPBELL CREEK COAL.

The Campbell Creek Coal of White[40], belonging at its type locality—near the mouth of Campbell Creek, Kanawha County —20 to 40 feet below the limestone last described, is a widely persistent and a very valuable deposit of fuel in Fayette. It is always multiple-bedded and much softer than any of the beds above it in the Kanawha Group. Southeastward along the Kanawha River from its type locaitly, the upper and lower benches are usually separated into two distinct beds by 5 to 35 feet of dark, argillaceous shale carrying plant fossils and a marine fossil fauna of the genus **Lingula,** this being especially true when the latter member thins below 10 feet. As shown in the reference last cited, the upper bench is then known as the **Peerless Coal,** and the lower, the **No. 2 Gas.** Both have been mined extensively on a commercial scale in the County as separate and distinct beds, and one operation (No. 39 on Map II) on Morris Creek, southward from Montgomery, has for its mining section of 6 feet the Peerless and the upper bench of the No. 2 Gas Coal, the top of a thick parting slightly above the middle of the latter constituting the pavement. The thickness and stratigraphic position of these two divisions of the Campbell Creek Coal proper are exhibited in the sections given in Chapter IV and in the logs of the Coal Test Borings published on subsequent pages in Chapter XI. The No. 2 Gas division, the detailed outcrop of which is shown on Map II, is the "key-rock" on which the green structure contours are based on the same map. In Chapter III, page 88, is published a table of intervals showing its approximate distance in feet above and below other well-known members of the rock column at 18 scattered points in the County.

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[39] I. C. White, Bull. 65. U. S. Geol. Survey, p. 168; 1891; and Vol. II. W. Va. Geol. Survey, p. 566; 1903.

[40] I. C. White, Bull. 65. U. S. Geol. Survey, p. 170; 1891; and Vol. II, W. Va. Geol. Survey, pp. 567-584; 1903.

The Campbell Creek Coal, as shown by Reger and the author on pages 185-190 of the Logan-Mingo Report, is the same as the **"Warfield", "Freeburn", "Burnwell",** and **"Upper War Eagle"** beds of Mingo County.

The thickness and character of both the Peerless and No. 2 Gas beds at the commercial mines and prospects, and the approximate minable area as shown on Figure 13, are published on subsequent pages in Chapter XI, along with an estimate of the available tonnage.

The Lower Campbell Creek Sandstone of Krebs[11], belonging in the interval separating the bed last described from the underlying Lower Campbell Creek Coal, is thin and lenticular in Fayette. Its thickness and stratigraphic position are exhibited in the Cannelton Section, page 119, and in the log of Coal Test Boring No. 6 on Map II, published in Chapter XI.

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[11] C. E. Krebs, Raleigh County Report, W. Va. Geol. Survey, p. 327; 1916.

THE LOWER CAMPBELL CREEK COAL.

The Lower Campbell Creek Coal of Krebs[42], belonging in the interval separating the ledge last described from the underlying Brownstown Sandstone, is thin, irregular, and usually slaty in Fayette, although developing locally into slightly over 3 feet of fair coal in the Herberton region, a feature, however, that hardly warrants its classification as a minable bed. Its thickness and stratigraphic position are exhibited in the sections given in Chapter IV for Cannelton, Columbia—1.2 Miles Southwest, Page, Kingston, and Herberton; and in the logs of Coal Test Borings Nos. 2, 5, and 6 on Map II, published in Chapter XI.

THE BROWNSTOWN SANDSTONE.

The Brownstown Sandstone of White[43], belonging at its type locality—Brownstown (now Marmet), Kanawha County —just below the Campbell Creek Coal, being bluish-gray in color, medium-grained, and ranging in thickness from 25 to 35 feet, is widely persistent in Fayette, usually occupying most of the interval between the coal last described and the underlying Powellton Coal. Its thickness and stratigraphic position are exhibited in the sections given in Chapter IV for Cannelton, Marting, Vanetta, Wyndal, and Panther Mountain for the Falls District region; Mt. Carbon, Columbia—1.2 Miles Southwest, Beckwith, Powellton—½ Mile Northwest, and Kingston in Kanawha; Ansted and Mulvane in Mountain Cove; Herberton in Fayetteville; and in the logs of Coal Test Borings Nos. 1, 5, and 7 on Map II, published on subsequent pages in Chapter XI. No quarries were observed on this ledge in Fayette but according to the reference last cited, it has been quarried considerably in Kanawha County along the Kanawha River for use in the U. S. Government's locks and dams on the latter stream. Its outcrop throughout the County should follow closely the same region as that outlined on Map II for the No. 2 Gas Coal bed.

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[42] Loc. cit., p. 328.

[43] I. C. White, Vol. II, W. Va. Geol. Survey, p. 586; 1903.

THE POWELLTON "A" COAL.

The Powellton "A" Coal of Reger and the author[44], belonging at its type locality in Mingo County, immediately at the base of the sandstone last described and 15 to 20 feet above the Powellton ("Hatfield Tunnel") Coal, is thin and unimportant as in the latter area, its thickness and stratigraphic position being exhibited in the sections published in Chapter IV for Powellton—½ Mile Northwest, and Kingston and in the logs of Coal Test Borings Nos. 1 and 12 on Map II, published on subsequent pages in Chapter XI.

THE POWELLTON (BROWNSTOWN) COAL.

The Powellton (Brownstown) Coal of White[45], belonging at its type localities—Powellton, Fayette County, and Brownstown (now Marmet), Kanawha County—5 to 10 feet below the Brownstown Sandstone, 60 to 70 feet below the Campbell Creek Coal and 60 to 100 feet above the Eagle bed, is widely persistent and a valuable bed of coal in Fayette. It is always multiple-bedded, medium-soft, columnar and mined extensively on a commercial scale in Kanawha District on the waters of Armstrong and Paint Creeks. Its thickness and stratigraphic position are exhibited in the sections published in Chapter IV and in the logs of Coal Test Borings Nos. 2, 3, 4, 5, 6, 7, and 12 on Map II, published in Chapter XI. Its outcrop should follow closely the same region as that outlined on Map II for the No. 2 Gas bed. Its thickness and character at the commercial mines, prospect openings, and crop exposures are described on subsequent pages in Chapter XI, along with Figure 14, showing its approximate minable area, and an estimate of its available tonnage.

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[44] Ray V. Hennen and D. B. Reger, Logan-Mingo Report, W. Va. Geol. Survey, p. 192; 1914.

[45] I. C. White, Vol. II, pp. 511-12 and 585; 1903; and Vol. II(A), pp 272 and 349; 1908; W. Va. Geol. Survey.

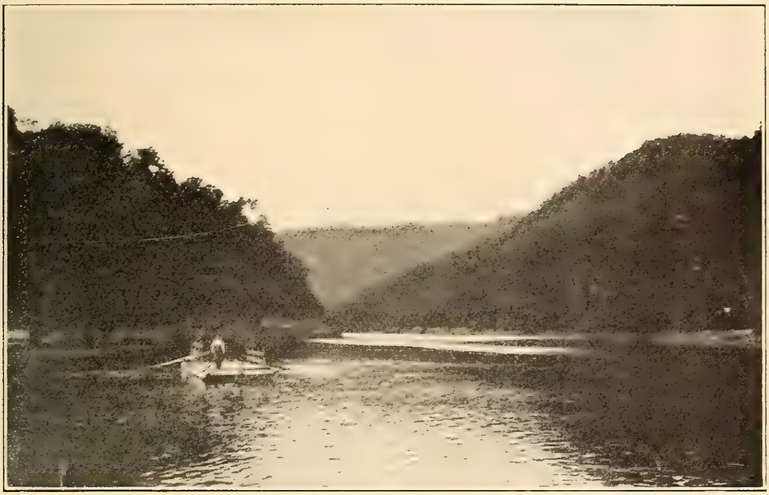

PLATE IX(a).—View looking northwest down Gauley River at Carnifex Ferry at mouth of Meadow River, showing topography of New River Group and Guyandot Sandstone cliffs at water-level on left.

PLATE IX(b).—View looking northwest across Sewell Creek valley from east slope of Boggs Knob at Sewell Mountain ridge on sky-line, showing topography of New River and Pocahontas Groups and Mauch Chunk Series.

THE STOCKTON (CANNELTON) LIMESTONE.

The Stockton (Cannelton) Limestone of White[46], belonging at its type locality—Cannelton, Kanawha County—75 to 80 feet below No. 2 Gas, 35 to 40 feet below the Powellton Coal, and 45 to 50 feet above the Eagle Coal, is very persistent in Fayette. According to the reference last cited, it was once manufactured into cement just across the Kanawha River from Montgomery at Cannelton and for that reason was known locally as the "Stockton" cement bed. It usually occurs in lenses, seldom exceeding 5 feet in thickness, carrying a high percentage of silica and seldom marine fossils. It often possesses a "cone-in-cone" structure similar to that described on a preceding page for the Campbell Creek Limestone. Twelve miles northwestward from Montgomery in Kanawha County, the author measured the following section at an exposure of the Stockton Limestone on the north bank of Simmons Creek, 0.7 mile northeast of the Kanawha River and 1¼ miles eastward from Marmet, the limestone here carrying marine fossils in profusion:

	Feet.	Inches.
Shales, sandy, visible	10	0
Limestone, Stockton, lenticular, cone-in-cone structure, **marine fossil shells** abundant (elevation, 675′ B.)	1	6
Shale, sandy, to railroad grade, visible	3	0

In the above exposure this limestone belongs about 650 feet below the Kanawha Black Flint and about 100 feet below the No. 2 Gas Coal bed.

As published on page 152 of the Wyoming-McDowell Report, the author found marine fossil shells in the dark shales immediately underlying the Stockton Limestone on Huff Creek in northern Wyoming County, where these same shales form the roof member of the Matewan Coal bed. The roof shales of the latter coal at several prospect openings in southeastern Boone County also carry marine fossils. Hence, in spite of the scanty occurrence of marine forms in the ledge itself in Fayette, the Stockton Limestone and its immediately underlying shales were evidently deposited in water ranging from fresh through brackish to salt or sea water.

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[46] I. C. White, Vol. II, W. Va. Geol. Survey, pp. 511 and 586; 1903.

Its thickness and stratigraphic position in this County are exhibited in the sections published in Chapter IV for Cannelton, Smithers, Boomer, Deepwater — ½ Mile North, and Gamoca in Falls District; and for Mt. Carbon, Kimberly, and Columbia—1.2 Miles Southwest, in Kanawha. Its outcrop should follow slightly below midway between the crops outlined on Map II for the No. 2 Gas and Eagle Coal beds.

The following section was measured by the author at its exposure on the east hillside of Morris Creek, 0.6 mile southward from the Kanawha River:

	Thickness. Feet.	Total. Feet.	
Coal, No. 2 Gas, estimated	4	4	
Slate and concealed	78	82	
Limestone, Stockton, siliceous (710′ B.)	2	84	84′
Shale, flaggy and sandy	10	94	
Concealed	22	116	
Shale, flaggy and sandy	10	126	
Coal, Eagle, at closed digging	3	129	45′
Concealed to bed of Morris Creek	10	139	10′

In Mountain Cove District the author measured with aneroid the following section at its crop in a coal railway cut, 1 mile northward from Ansted and 0.2 mile southeast of Mine Opening No. 52 on Map II, 70 feet below the No. 2 Gas Coal, and at an elevation of 1680′ B.:

	Feet.	Inches.
Sandstone, massive, grayish-brown, **Brownstown**	35	0
Shale, sandy	8	0
Limestone, Stockton, siliceous, lenticular, 0″ to	0	8
Shale, sandy	4	0
Shale, dark, siliceous	6	0
Coal, Matewan	0	6
Sandstone, **Matewan**	..	..

Like the Campbell Creek ledge, this limestone is too impure, irregular and scanty in its occurrence to be of much economic importance, serving only to slightly enrich the soil immediately along its outcrop.

THE MATEWAN COAL.

The Matewan Coal of Reger and the author[47], belonging at its type locality—Matewan, Mingo County—150 feet below the No. 2 Gas Coal, 60 to 70 feet below the Powellton ("Hatfield Tunnel") Coal, and 20 to 30 feet below the Stockton Limestone, is present in Fayette but thin and unimportant from an economic standpoint. Its thickness and stratigraphic position are exhibited in the sections published in Chapter IV for Mt. Carbon, Kimberly, Columbia—1.2 Miles Southwest, Powellton—½ Mile Northwest, Head of Powellton Fork, Head of Johnson Fork, and Kingston in Kanawha District; Ansted in Mountain Cove; Herberton in Fayetteville; and in the logs of Coal Test Borings Nos. 2, 3, 4, 5, and 6 on Map II in Falls District. It is evident from the data given at these scattered points that it is too thin and irregular to be classed as minable.

The **Matewan Sandstone** of Reger and the author[48], belonging at its type locality—Matewan, Mingo County—5 feet below the Matewan Coal, is more or less lenticular and irregular, being absent entirely in the northwest border of the County. Its thickness and stratigraphic position are exhibited in the section published in Chapter IV for Herberton, page 193.

The **Eagle "A" Coal** of Reger and the author[49], belonging at its type locality in Logan and Mingo Counties in the interval separating the ledge last described from the underlying Eagle Sandstone, was not observed in Fayette County.

THE EAGLE SANDSTONE.

The Eagle Sandstone of Reger and the author[50], belonging at its type locality—Man, Logan County—in the interval separating the coal last mentioned from the underlying Eagle bed, is very persistent in Fayette, where it is usually massive, medium- to coarse-grained, greenish-gray to brown in color, ranging in thickness from 20 to 50 feet. It usually forms steep slopes along its outcrop. Its thickness and stratigraphic position are exhibited in the sections given in Chapter IV for Marting and Vanetta in Falls District; Columbia—1.2 Miles Southwest, and Kingston in Kanawha; Parral and Herberton in Fayetteville; and in the logs of Coal Test Borings Nos. 3, 4, 5, 6, and 7 on Map II, the details of which are published on subsequent pages in Chapter XI. As it belongs only 5 to 10 feet above the Eagle Coal, its outcrop follows closely the same regions as outlined for the latter bed on Map II. No quarries were observed on it within the County.

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[47] Ray V. Hennen and D. B. Reger, Logan-Mingo Report, W. Va. Geo. Survey, p. 197; 1914.

[48] Loc. cit., p. 199.

[49] Loc. cit., pp. 62 and 200.

[50] Loc. cit., pp. 62 and 202.

THE EAGLE COAL.

The Eagle Coal of White[51], belonging at its type locality—Eagle, in the territory of this Report—120 to 140 feet below the No. 2 Gas division of the Campbell Creek Coal and 90 to 100 feet above the marine fossiliferous Eagle Limestone and Shale, is very persistent and a valuable deposit of fuel in Fayette County. Here, it is usually multiple-bedded, soft and columnar, its bed-structure being in marked contrast to that prevailing in the same region for the coal beds in the upper portion of the Kanawha Group. It has been mined extensively on a commercial scale in Falls, Kanawha, and the southwest border of Fayetteville District, and is highly prized as a coking and steam coal. Its thickness and stratigraphic position are exhibited in a number of the sections published in Chapter IV; in the logs of Oil and Gas Borings Nos. 12, 21, 22, and 29 on Map II, published in Chapter X; and in the logs of Coal Test Borings Nos. 2, 3, 4, 5, 6, 7, and 12 on Map II, published in Chapter XI. Its detailed outcrop is shown on the same map.

The **"Middle War Eagle"** of Mingo and **"Mohawk"** bed of western McDowell County correlate with the Eagle Coal as shown by the author on pages 203-4 and 154-5 of the Logan-Mingo Report and the Wyoming-McDowell Report, respectively.

Its position in the Pottsville Series in the northern border of the State is suggested by the author on a preceding page of this Chapter in the Rowlesburg (Preston County) Section and the introduction thereto, given under the description of the Coalburg Coal, page 237.

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[51] I. C. White, Bull. 65, U. S. Geol. Survey, p. 140; 1891; and Vol. II, W. Va. Geol. Survey, p. 587; 1903.

Its thickness and character at the commercial mines, prospect diggings and crop exposures are described on subsequent pages in Chapter XI, along with Figure 15, showing its approximate minable area, and an estimate of its available tonnage.

The **Bens Creek Sandstone** and the **Bens Creek Coal** of Reger and the author[52], belonging at their type localities—Bens Creek, Mingo County—in the interval separating the coal last described from the underlying Decota Sandstone, were not observed, a feature that is not unexpected, since the Bens Creek Coal was originally described as a "split" off the Eagle bed proper southwestward from the northern border of Mingo County, the Bens Creek Sandstone occupying most of the interval between the two divisions of the latter coal.

THE DECOTA SANDSTONE.

The Decota Sandstone of Krebs[53], belonging at its type locality on Cabin Creek, Kanawha County, in the interval separating the Eagle Coal from the underlying Little Eagle bed, is very persistent in Falls, Mountain Cove, and the northern half of Kanawha District, but in the southwest border of the latter area, it frequently thins away entirely, permitting the junction of the two coal beds last mentioned. It is usually massive, medium- to coarse-grained, micaceous, greenish-gray to brown in color, and seldom exceeding 40 feet in thickness. Its stratigraphic position is exhibited in the sections published in Chapter IV for Smithers, Columbia—1.2 Miles Southwest, Powellton, Sugar Creek, and Parral; and in the logs of Coal Test Borings Nos. 2, 3, 4, and 6 on Map II, the details of which are published in Chapter XI.

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[52] Ray V. Hennen and D. B. Reger, Logan-Mingo Report, W. Va. Geol. Survey, pp. 204-6; 1914.

[53] C. E. Krebs, Kanawha County Report, W. Va. Geol. Survey, p. 292; 1914.

THE LITTLE EAGLE COAL.

The Little Eagle Coal of White[54], belonging at its type locality—Eagle, in the territory of this Report—20 to 30 feet below the Eagle Coal and 75 to 80 feet above the marine fossiliferous Eagle Limestone and Shale, is very persistent and attains minable dimensions over a considerable portion of the County. Like the Eagle, it is soft and columnar, and ranges in thickness from 18 inches to 4 feet. Its roof shales at Smithers carry fossil shells as in Wyoming County, these at Smithers being apparently brackish water in their origin. The thickness and stratigraphic position of the Little Eagle Coal are exhibited in the sections published in Chapter IV. It was once mined commercially as a separate and distinct bed northward from Parral at **Coal Mine No. 93 on Map II,** as shown in the section for Parral, page 186. On the waters of Paint Creek in the southern border of Kanawha District, the shales and sandstone separating this bed from the overlying Eagle Coal have thinned almost entirely away, permitting both to be mined commercially as a single bed, as exhibited in the sections published in Chapter IV for Keeferton, Kingston—1.7 Miles West, and Kingston, pages 164, 165, and 166, respectively. Its outcrop should follow closely below the same region as outlined on Map II for the Eagle Coal. Its thickness and character at the commercial mines, prospect diggings and other exposures, along with Figure 16, showing its approximate minable area, are published in Chapter XI, as also an estimate of its available tonnage.

The **Cedar Coal** and the **Grapevine Sandstone** of Reger and the author[55], belonging at their type localities in southern Mingo County in the interval separating the coal last described from the underlying marine fossiliferous Eagle Limestone and Shale, were not observed. The absence of the first mentioned, however, is not unexpected as it was originally described as probably a "split" off the Little Eagle bed proper of the Kanawha Valley, a local feature for its type locality.

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[54] I. C. White, Bull. 65, U. S. Geol. Survey, p. 177; 1891; and Vol. II, W. Va. Geol. Survey, pp. 592-3; 1903.

[55] Ray V. Hennen and D. B. Reger, Logan-Mingo Report, W. Va. Geol. Survey, p. 210-211; 1914.

The stratigraphic position of each in the southern border of the State is exhibited in the General Section of the Pottsville Series, in Chapter IV, page 105.

THE EAGLE LIMESTONE AND SHALE.

The marine fossiliferous Eagle Limestone and Shale of White[56], belonging at their type locality—Eagle, in the territory of this Report—90 to 100 feet below the Eagle Coal and 75 to 80 feet below the Little Eagle bed, and both together ranging in thickness from 5 to 20 feet, are probably the most persistent "key-rocks" of the Pottsville Series of West Virginia. The author has personally traced this marine horizon from Camden-on-Gauley in western Webster County, southwestward across Nicholas, Fayette, Kanawha, Boone, Logan and Mingo Counties to the Kentucky State Line, 0.4 mile east of Delorme; and then southeastward in Mingo and across McDowell County to the Virginia State Line near Paynesville P. O. Its position in the Pottsville Series in the northern border of the State is very probably represented by the fossiliferous shale, 25 to 30 feet below the Quakertown (Campbell Creek?) Coal in the Rowlesburg (Preston County) Section, published on page 237 of this Chapter under the description of the Coalburg Coal. Northeastward from Camden-on-Gauley, Reger, in a verbal communication, reports having traced it in Webster County to the waters of Holly River. Northeastward from the Summersville region of Nicholas County, it appears to lose its marine character, the fossil shells indicating a brackish-water fauna.

In Fayette the limestone is locally known as "Black Marble", as it is usually dark in color, and it occurs in lenses frequently with a "cone-in-cone" structure, with a high percentage of silica. Although the associated dark fossiliferous shale is always present, the same is not true for the limestone, as it is often absent and frequently replaced by 6 inches to 2 feet of yellowish-brown, highly marine fossiliferous sandstone, features that are characteristic of it in Logan, Mingo, Wyoming, and McDowell Counties. The thickness and stratigraphic position of both the limestone and shale are exhibited in the General Section of the Pottsville and the special sections published in Chapter IV for Vanetta, Gamoca, Albion, and Mouth of Peters Creek in the Falls District region; Mt. Carbon, Deepwater, Kimberly, Columbia, Columbia—1.2 Miles Southwest, Elk Ridge, Powellton, Keeferton, and Kingston in Kanawha District; Ansted and Mulvane in Mountain Cove; and Fayetteville—1½ Miles Northwest, Sugar Creek, Parral, Carlisle, Potato Hill Knob, and Herberton in Fayetteville. Its detailed outcrop is shown on Map II.

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[56] I. C. White, Bull. 65, U. S. Geol. Survey, pp. 140 and 177; 1891; and Vol. II, W. Va. Geol. Survey, p. 593; 1903.

In addition to the exposures noted in the several sections mentioned, three others will now be described in southern Kanawha District. The following section was measured at an exposure of the Eagle Limestone on the east hillside of Powellton Fork, 0.2 mile northwest of the mouth of Woodrum Branch, the ledge belonging here 100 feet below the crop of the Eagle Coal and 200 feet below the Powellton bed at Coal Mine No. 58 on Map II:

	Feet.	Inches.
Shales, sandy and flaggy, visible	15	0
Limestone, Eagle, black, cherty (1390′ B.)	1	0
Sandstone, yellowish-brown, marine fossils	1	0
Shale, black, Eagle, to bed of Powellton Fork	6	0

The following section was measured by the author at an exposure on the east bank of Armstrong Creek, 0.3 mile northwest of the junction of Right and Left Forks:

			Feet.	Inches.
Shale, sandy, flaggy, laminated, dark and buff			35	0
Limestone, black, lenticular, 0″ to	1′ 3″	**Eagle Limestone** (1280′ B.)	3	2
Slate, black	1 0			
Slate, black, bituminous	0 3			
Limestone, siliceous, marine fossils abundant, 2″ to	0 8			
Shale, Eagle, dark, to bed of Armstrong Creek			6	0

The author collected a sample of the upper limestone here for analysis, the composition of which, as reported by Messrs. Hite and Krak, is as follows:

	Per cent.
Silica (SiO_2)	13.47
Ferric iron (Fe_2O_3)	4.09
Alumina (Al_2O_3)	4.24
Calcium Carbonate ($CaCO_3$)	72.66
Magnesium Carbonate ($MgCO_3$)	2.32
Potassium (K_2O)	0.38
Sodium (Na_2O)	0.89
Phosphoric Acid (P_2O_5)	0.30
Loss on ignition	1.07
Total	99.42

The above sample is typical of the occurrence of the Eagle Limestone in the southern half of the State, and the results show that it carries a high percentage of the impurities—Silica, Ferric Iron, and Alumina.

A list of the species of the marine fossil fauna from both the limestone and the shale, thus far reported by W. Armstrong Price, is published in a table at the end of this Chapter.

THE LITTLE CEDAR COAL.

The Little Cedar Coal of Reger and the author[57], belonging at its type locality—Cedar, Mingo County—immediately at the base of the marine fossiliferous stratum last described, was observed along the southeast outcrop of the basal members of the Kanawha Group in Fayette, where it appears to be irregular in its deposition and hardly attaining sufficient thickness to class it as a minable bed. Its stratigraphic position is exhibited in the sections given in Chapter IV for Parral, Potato Hill Knob, and Herberton, all in Fayetteville District. The latter town is 48 miles northeast of the type locality of this bed in Mingo. It was also observed by the author[58] in western McDowell and Wyoming Counties, thus indicating for it a wide distribution, although not attaining minable dimensions, purity, and regularity.

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[57] Ray V. Hennen and D. B. Reger, Logan-Mingo Report, W. Va. Geol. Survey, p. 215; 1914.

[58] Ray V. Hennen, Wyoming-McDowell Report, W. Va. Geol. Survey, pp. 161-2; 1915.

THE LOWER WAR EAGLE SANDSTONE.

The Lower War Eagle Sandstone of Reger and the author[59], belonging at its type locality—Turkey Creek, near War Eagle, Mingo County—in the 35 to 40 feet of measures separating the overlying Eagle Limestone and Shale from the underlying Lower War Eagle Coal and ranging in thickness from 20 to 30 feet, is very persistent in Fayette. Here it is usually massive, coarse, friable, and greenish-gray to brown in color, and it generally forms prominent bluffs or escarpments along its outcrop. Its thickness and stratigraphic position are exhibited in the sections published in Chapter IV for Albion, Peters Creek, Panther Mountain, and Deitz in the Falls District region; Elk Ridge, Powellton—½ Mile Northwest, and Powellton in Kanawha District; and Fayetteville—1.5 Miles Northwest, Sugar Creek, Parral, Bishop, and Potato Hill Knob in Fayetteville District. Its outcrop should follow roughly the same region as that outlined for the Eagle Limestone and Shale on Map II. No quarries were observed on it, and it is doubtful if it could be used successfully for walls and building purposes in structures exposed to the weather, owing to its usually soft and friable nature where exposed at outcrop.

THE LOWER WAR EAGLE COAL.

The Lower War Eagle Coal of White[60], belonging at its type locality—east hillside of Turkey Creek, 1.5 miles northeast of War Eagle, Mingo County—5 to 10 feet below the sandstone last described, 256 feet below the Eagle ("Middle War Eagle") Coal, and 59 feet below the marine fossiliferous Eagle Limestone and Shale, is very persistent in Fayette, at an interval ranging from 20 to 60 feet below the latter members. It is usually multiple-bedded, soft and columnar, ranging in thickness from a few inches to 3 feet, including the parting shale, in the Herberton region. As in Mingo County and in western Wyoming and McDowell, it usually has for its roof a black, cannelly slate, 12 to 18 inches in thickness, which, near Herberton, carries many fossil shells of the genus Lingula. In Volume II(A) of the State Survey Reports, pages 326, 330, and 342, the **"Kidd" Coal** at **Opening 98 on Map II,** slightly less than one-half mile west of the latter town, has been erroneously correlated with the Lower War Eagle bed. The Herberton Section, page 193, shows that the former belongs 276 feet lower in the measures at the horizon of the Douglas Coal of the author[61].

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[59] Ray V. Hennen and D. B. Reger, Logan-Mingo Report, W. Va. Geol. Survey, p. 216; 1914.

[60] I. C. White, Vol. II(A), W. Va. Geol. Survey, pp. 318 and 325; 1908.

Its thickness and stratigraphic position are exhibited in the sections published in Chapter IV for Panther Mountain, Deepwater, Powellton—½ Mile Northwest, Kingston, Fayetteville—1.5 Miles Northwest, and Herberton. Owing to its irregular bed-section, it can hardly be classed as a minable seam, although that portion of Kanawha and Fayetteville Districts lying to the southwest of Paint Creek may possibly furnish a considerable tonnage from this bed.

THE UPPER GILBERT SANDSTONE.

The Upper Gilbert Sandstone of Reger and the author[62], longing at its type locality—Gilbert, Mingo County—1 to 5 feet below the coal last described and ranging in thickness from 40 to 50 feet, is widely persistent in Fayette, where it is usually massive, coarse, micaceous, friable, and brown in color, in the northeastern border of the County frequently coalescing with the Lower Gilbert Sandstone into a great ledge 50 to 60 feet in thickness. When the last-mentioned feature occurs, the intervening **Glenalum Tunnel Coal,** described next below, is cut away entirely. The thickness and stratigraphic position of this sandstone are exhibited in the sections published in Chapter IV for Albion and Panther Mountain for the southern edge of Nicholas County; for Deepwater in Kanawha District; Ansted and Mulvane in Mountain Cove; Parral, Bishop, Potato Hill Knob, and Herberton in Fayetteville; and in the log of the Montgomery Heirs No. 1 well (No. 11 on Map II), published in Chapter X. Its outcrop should follow closely the same region outlined on Map II for the Gilbert Coal, as it belongs only 60 to 125 feet above the latter bed.

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[61] Ray V. Hennen, Wyoming-McDowell Report, W. Va. Geol. Survey, pp. 181-2; 1915.

[62] Ray V. Hennen and D. B. Reger, Logan-Mingo Report, W. Va. Geol. Survey, pp. 217-8; 1914.

The **sandstone quarry** on the east bank of Gauley River, opposite the mouth of Twentymile Creek and 0.3 mile southeast of Belva, appears to be in the Upper Gilbert ledge, its base belonging, as it does, 260 feet below the No. 2 Gas Coal bed and 35 to 40 feet below the horizon of the marine fossiliferous Eagle Limestone and Shale. Teets obtained the following data at this quarry:

Sandstone Quarry No. 1 on Map II.

	Feet.
Shale, sandy..................................	
Sandstone, Upper Gilbert, quarry ledge, massive, medium-grained, micaceous, gray..............	20

"Elevation of base of quarry, 715' L.; quarry face about 300 feet long, stone from the same being used in the construction of the foundation and abutments of the C. & O. Railroad bridge over Gauley River at this point."

This is the only quarry observed on this ledge within the County; in fact, at many of its crop exposures it appears to be too soft and friable to stand weathering in exposed structures.

The **Oceana Limestone** of the author, originally described on pages 164-5 of the Wyoming-McDowell County Report of the State Geological Survey and belonging at its type locality —Oceana, Wyoming County—in the shale interval separating the ledge last described from the underlying Glenalum Tunnel Coal, was not observed in Fayette County.

THE GLENALUM TUNNEL COAL.

The Glenalum Tunnel Coal of Reger and the author[63], belonging at its type locality—Glenalum Junction, Mingo County—80 to 100 feet below the Lower War Eagle bed and immediately above the Lower Gilbert Sandstone, is fairly persistent in Fayette and attains sufficient thickness, purity, and regularity in the southern border of Kanawha and the southwest border of Fayetteville District to warrant its classification as a minable seam. As at its type locality, it is usually soft, columnar, and multiple-bedded. It has never been mined commercially in the State. Its thickness and stratigraphic position are exhibited in the sections given in Chapter IV for Elk Ridge, Powellton—½ Mile Northwest, Powellton, Keeferton, and Kingston in Kanawha District, Ansted in Mountain Cove; Carlisle, Potato Hill Knob, and Herberton in Fayetteville; and in the logs of test wells for oil and gas—Montgomery Heirs Nos. 1 and 2, Nos. 11 and 12 on Map II, respectively. Its outcrop follows closely the same region as that shown on Map II for the Gilbert Coal.

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[63] Loc. cit., pp. 218-9 and 707-715.

Its thickness and character at prospect openings and crop exposures, along with Figure 17, showing its approximate minable area, and an estimate of its available tonnage, are published in Chapter XI.

THE LOWER GILBERT SANDSTONE.

The Lower Gilbert Sandstone of Reger and the author[64], belonging at its type locality—Gilbert, Mingo County—immediately below the coal last described, 20 to 40 feet below the Upper Gilbert Sandstone, and ranging in thickness from 50 to 80 feet, is widely persistent in Fayette, although not attaining the massive development of the former County. It is very similar in physical appearance and texture to the Upper Gilbert ledge with which, as mentioned above under the description of the latter, it frequently coalesces in the northeast border of the County. Its thickness and stratigraphic position are exhibited in the sections published in Chapter IV for Albion in the southern edge of Nicholas County; for Elk Ridge, Powellton—½ Mile Northwest, Powellton, Keeferton, and Kingston in Kanawha District; and Carlisle and Herberton in Fayetteville. As it belongs usually less than 10 feet above the Gilbert Coal, its outcrop, along which it generally forms bluffs and steep slopes, follows closely the same region as outlined for the latter bed on Map II. No quarries were observed on it.

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[64] Loc. cit., p. 219.

The **Gilbert "A" Coal** of the author[65], belonging at its type locality—near Bearwallow Knob, southern edge of McDowell County—immediately at the base of the sandstone last described and 30 to 50 feet above the Gilbert Coal proper, was not observed in the territory of this Report.

THE GILBERT SHALE.

The Gilbert Shale of the author[66], belonging at its type locality—western Wyoming County—immediately at the base of the sandstone last described, ranging in thickness from 2 to 10 feet, and carrying a fossil fauna that indicates largely marine deposition, is very persistent in Fayette, where it belongs directly above the Gilbert Coal. Its thickness and stratigraphic position are exhibited in the sections published in Chapter IV for Mt. Carbon, Deepwater, Powellton—½ Mile Northwest, and Powellton in Kanawha District; Ansted in Mountain Cove; and Carlisle in Fayetteville, at the most of which places it carries fossil shells of types indicating either marine or brackish-water deposition. It is now the author's belief that the **Dorothy Limestone** of Krebs[67] is intimately associated with this shale instead of correlating with the Oceana Limestone as tentatively suggested on page 164 of the Wyoming-McDowell Report. As shown in the Mt. Carbon Section, page 147, this conclusion is corroborated by the presence of a fossil shell—**Allerisma guyandotensis**—in the Gilbert Shale, a species characteristic of the Dorothy Limestone in Raleigh County. At this Mt. Carbon exposure, the limestone immediately above the latter shale is dark in color, siliceous, and lenticular, with a "cone-in-cone" structure characteristic of the limestones of the Kanawha Group, its thickness ranging from 2 inches to 2 feet. This is the only point in the County that limestone was observed at this horizon.

A list of the fossil fauna thus far reported from the Gilbert Shale is published in a table at the end of this Chapter.

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[65] Ray V. Hennen, Wyoming-McDowell Report, W. Va. Geol. Survey, p. 167; 1915.

[66] Loc. cit., p. 168.

[67] C. E. Krebs, Raleigh County Report, W. Va. Geol. Survey, p. 353; 1916.

THE GILBERT COAL.

The Gilbert Coal of Reger and the author[68], belonging at its type locality—Gilbert, Mingo County—20 to 30 feet below the Lowe Gilbert Sandstone and 0 to 5 feet above the Dotson Sandstone, is widely persistent in Fayette and attains minable dimensions over a considerable area in the County. It is soft, columnar, and multiple-bedded, seldom attaining 4 feet in thickness. Its stratigraphic position is exhibited in the sections published in Chapter IV for Gamoca and Albion for the Falls District region; Deepwater, Powellton, Head of Johnson Fork, and Kingston in Kanawha District; Ansted in Mountain Cove; Potato Hill Knob and Herberton in Fayetteville; and in the log of Coal Test Boring No. 13 on Map II, published in Chapter XI. Its detailed outcrop is shown on Map II. For reasons mentioned in Chapter IV in the introduction to the General Section of the Pottsville Series, page 100, the outcrop of this bed on Map II accompanying the Detailed Report for Wyoming and McDowell Counties, published in 1915, was erroneously made the division line by the author between the Kanawha and New River Groups of the last-mentioned series, instead of at the top of the Panther (Upper Nuttall) Sandstone, 270 feet lower in the measures.

The Gilbert Coal has not been mined commercially but it has been opened extensively by natives, especially in the northeast portion of the County. Its thickness and character at these diggings and at crop exposures, along with Figure 18, showing its approximate minable area, are published in Chapter XI, as also an estimate of its available tonnage.

THE DOTSON SANDSTONE.

The Dotson Sandstone of Campbell[69], belonging at its type locality—Wyoming Station (formerly Dotson), Mingo County—as determined by the author[70], 2 feet below the coal last described, 260 to 275 feet below the marine fossiliferous

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[68] Ray V. Hennen and D. B. Reger, Logan-Mingo Report, W. Va. Geol. Survey, pp. 221-2; 1914.

[69] M. R. Campbell, Tazewell Folio, No. 44, U. S. Geol. Survey; 1898.

[70] Ray V. Hennen, Wyoming-McDowell Report, W. Va. Geol. Survey, pp. 85 and 180-1; 1915.

Eagle Shale, and attaining a thickness of slightly over 100 feet, is widely persistent in Fayette, where it is generally massive, softer, more friable, coarse-grained, micaceous, brown to reddish-brown in color, often carrying concretionary masses banded with iron ore streaks and seldom exceeding 60 feet in thickness. For reasons given in the introduction to the General Section of the Pottsville Series published in Chapter IV, page 100, this ledge, in the reference last cited, was erroneously correlated with the Nuttall Sandstone of Campbell and White[71], or the top member of the New River Group at their type locality in the territory of this Report. The section last mentioned shows what now seems beyond doubt to be the true division plane between the Kanawha and New River divisions of the Pottsville, in McDowell County. In the general section of the latter series, published on pages 51-60 of the Wyoming-McDowell Report, local names for McDowell County were given for the members of that portion of the rock column which should be included in the Kanawha Group instead of the New River.

The thickness and stratigraphic position of the Dotson Sandstone in Fayette are exhibited in the sections published in Chapter IV for Peters Creek, Panther Mountain, and Deitz in the Falls District region; Deepwater, Powellton, Keeferton, and Kingston in Kanawha District; Ansted in Mountain Cove; Fayetteville—1.5 Miles Northwest, Sugar Creek, Parral, Bishop, Carlisle, Potato Hill Knob, and Herberton in Fayetteville; and in the logs of test wells for oil and gas Nos. 11, 20, and 38 on Map II, published in Chapter X. Its outcrop should follow closely along the same region as that outlined on Map II for the Gilbert Coal.

At its type locality on the Mingo-Wyoming County Line, this sandstone carries many iron ore nodules. The photograph published in this Report of an exposure of the same ledge in the northwest edge of the town of Fayetteville, exhibits numerous iron bands forming the enclosing shells of large concretionary masses. Here, it is so soft and friable that a water well was excavated through it without the use of explosives, a mattock and shovel only being utilized. However, in some portions of the County, it hardens into a rock capable of furnishing a fair building stone. At **Sandstone Quarry No. 2 on Map II,** in the northern border of Falls District, on the west bank of Rich Creek, ½ mile southeast from the Gauley River, Teets reports a quarry in a sandstone at an elevation of 726′ L., the base of which belongs 425 feet below the No. 2 Gas Coal. This interval should place the quarry-rock at the horizon of the Dotson. He reports a thickness of 40 feet of sandstone and a quarry-face 75 feet in length and driven back 15 feet into the hill. He fails to give the purposes for which the stone was quarried, but it was probably utilized in the construction of buildings in connection with the mining plant, just opposite, on the east hillside of Rich Creek at Coal Mine No. 36 on Map II.

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[71] I. C. White, Bull. 65, U. S. Geol. Survey, p. 200; 1891; Vol. II, pp. 616 and 655; 1903; and Vol. II(A), pp. 253-4; 1908, W. Va. Geol. Survey; and M. R. Campbell, Raleigh Folio, No. 77, U. S. Geol. Survey; Dec., 1901.

It also appears to be the Dotson ledge that is operated at **Sandstone Quarry No. 3 on Map II,** 6 miles southeastward in Mountain Cove District, 0.6 mile northeast of Ansted, at an elevation of about 1375′ B., as determined by Teets, the base of the quarry coming here about 460 feet below the No. 2 Gas Coal bed and about 575 feet above the Sewell seam. Here, he reports the quarry-face 200 feet in length, 20 feet in height and driven southeastward 50 feet into the hill.

The **Douglas "A" Coal** of the author[72], belonging at its type locality in southern McDowell County immediately at the base of the sandstone last described, 30 to 50 feet above the Douglas Coal proper, and seldom exceeding one foot in thickness, was not observed in Fayette County.

THE DOUGLAS COAL.

The Douglas Coal of the author[73], belonging at its type locality—Douglas, McDowell County—15 to 30 feet below the sandstone last described, is fairly persistent and attains minable dimensions, purity, and regularity in the southwestern portions of Kanawha and Fayetteville Districts. As mentioned on a preceding page under the description of the Lower War Eagle Coal, it is this bed instead of the latter that was formerly mined at the **Lewis Kidd Coal Opening—No. 98 on Map II,** slightly less than one-half mile west of Herberton, where it is locally known as the **"Kidd" Coal** and references to which are published by I. C. White on pages 326, 330, and 342 of Volume II(A) of the State Geological Survey Reports. Its thickness and stratigraphic position are exhibited in the sections published in Chapter IV for Panther Mountain in the southern edge of Nicholas County; Deepwater, Keeferton, and Kingston in Kanawha District; Ansted and Mulvane in Mountain Cove; Fayetteville—1.5 Miles Northwest, Parral, Bishop, and Herberton in Fayetteville; and in the logs of Coal Test Borings Nos. 13 and 38 on Map II, the details of which are published in Chapter XI and in the Parral Section, page 186, respectively. It is always soft, columnar, and multiple-bedded and has an excellent reputation as a steam and domestic fuel. Its outcrop belongs about midway between those outlined on Map II for the Gilbert and Lower Douglas Coal beds.

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[72] Ray V. Hennen, Wyoming-McDowell Report, W. Va. Geol. Survey, p. 181; 1915.

[73] Loc. cit., pp. 181-2.

Although mined commercially in McDowell County, there are no such operations in Fayette, but it has been prospected by natives for local domestic fuel. Its thickness and character at these diggings and crop exposures, along with Figure 19, showing its approximate minable area, are published in Chapter XI, and also an estimate of its available tonnage.

THE LOWER DOTSON SANDSTONE.

From 0 to 5 feet below the coal last described and 20 to 40 feet below the Dotson Sandstone there occurs at the type locality of the latter ledge a heavy to current-bedded, medium-grained to coarse, grayish-white to brown, sometimes conglomeratic sandstone, ranging in thickness from 60 to 100 feet, that was designated the "'Lower Nuttall" by the author on page 182 of the Wyoming-McDowell Report of the State Survey, for reasons already discussed above under the description of the Gilbert Coal and the Dotson Sandstone. As shown in the general section of the Pottsville Series published in Chapter IV, pages 106-7, the Nuttall Sandstones of the New

River region of Fayette County should belong considerably lower in the measures, so that the name suggested would not apply. Hence, it is renamed in this Report the **Lower Dotson Sandstone** in contradistinction to the Dotson ledge, as it also attains a fine development at the type locality of the latter sandstone in McDowell County. Its thickness and stratigraphic position in Fayette County are exhibited in the sections published in Chapter IV for Deepwater, Keeferton and Kingston in Kanawha District; Mulvane in Mountain Cove; Parral, Bishop, and Carlisle in Fayetteville; in the logs of test wells for oil and gas—Nos. 14 and 37 on Map II, published in Chapter X; and in the logs of Coal Test Borings Nos. 75 and 80 on Map II, published in Chapter XI. Its outcrop, along which it usually forms steep slopes and sometimes cliffs, follows closely above that outlined on Map II for the division line between the Kanawha and New River Groups of the Pottsville Series. The latter feature does not often happen, as this ledge in Fayette is very similar in texture and physical appearance to that described above for the Dotson Sandstone in the same County. No quarries were observed on it within the area.

THE DOUGLAS SHALE.

The Douglas Shale of the author[74], belonging at its type locality—Douglas, McDowell County—in the 10 to 15 feet of interval separating the sandstone last described from the underlying Lower Douglas Coal, having a dark to black color and a siliceous and laminated nature, and carrying **Lingula kanawhensis** and some other obscure remains of gastropoda, is very persistent in Fayette. Here it is very similar in physical appearance and carries practically the same fossil fauna, or one indicating either marine or brackish-water deposition. Its thickness and stratigraphic position are exhibited in the sections published in Chapter IV for Mulvane and Fayetteville—1.5 Miles Northwest and in several of the short sections below under the description of the Lower Douglas Coal; also in the logs of Coal Test Borings Nos. 16 and 37 on Map II, details of which are published in Chapter XI.

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[74] Loc. cit, pp. 183-4.

THE LOWER DOUGLAS COAL.

The Lower Douglas Coal of the author[75], belonging at its type locality—Douglas, McDowell County—immediately below the shale last described, 100 to 120 feet below the Douglas Coal, and 1 to 5 feet above the Panther Sandstone, now believed to represent the Upper Nuttall Sandstone or top member of the New River Group, for reasons mentioned near the beginning of Chapter IV, is widely persistent in Fayette, although seldom attaining minable dimensions, purity, and regularity. It is usually soft and columnar, carrying slate partings, and ranging in thickness from 6 to 18 inches. Its stratigraphic position is exhibited in the sections published in Chapter IV for Fayetteville—1.5 Miles Northwest and Bishop —0.6 Mile Northwest; in the log of the Hill-Long No. 1 well—No. 6A on Map II—near Belva, published in Chapter X; and in the logs of Coal Test Borings No. 16, 29, 37, 68, 75, and 80 on Map II, details of which are published in Chapter XI. Its outcrop is shown on Map II by the dotted division line between the Kanawha and New River Groups of the Pottsville Series. As mentioned on a preceding page of this Chapter under the description of the Gilbert Coal, the outcrop line of this bed instead of the latter should have been drawn on Map II, accompanying the Wyoming-McDowell Report, as the division line between the two groups last mentioned. In the reference last cited this bed was tentatively correlated with the Hughes Ferry Coal of White[76], belonging about 200 feet down in the New River Group; and also with the Sharon bed of the northern border of the State. The more recent investigations of the author in Fayette, Nicholas, Clay, and Braxton Counties and western Webster; and those of Reger in Barbour, Upshur, Randolph, Webster and Nicholas Counties tend to prove that the latter bed may correlate with the Sewell Coal of the New River Group, and that the Hughes Ferry bed, instead of correlating with the Lower Douglas, is most probably represented by the Iaeger Coal of McDowell County, 175 to 200 feet lower in the measures, for reasons given with the introduction to the General Section of the Pottsville Series, page 100.

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[75] Loc. cit., pp. 184-5.

[76] I. C. White, Vol. II(A), W. Va. Geol. Survey, pp. 252-3; 1908

In **Mountain Cove District** at **Coal Exposure No. 229 on Map II,** in the James River & Kanawha Turnpike, ¼ mile west of Victor, the author measured the following section:

	Feet.
Shale, sandy	6
Shale, **Douglas**, black, with **Lingula** fossil shells	3
Coal, Lower Douglas, slaty, 8″ to (1425′ B.)	1
Shale, gray, sandy	10
Sandstone, **Upper Nuttall**, visible	50

One and three-tenths miles eastward in the same turnpike, the author obtained the following section at **Coal Exposure No. 230 on Map II:**

	Feet.	Inches.
Shale, **Douglas**, dark, fossil shells	..	..
Coal .... 0′ 1″ Shale, gray. 0 3 **Coal** 0 7		
} **Lower Douglas** (1580′ B.)	0	11

At **Coal Exposure No. 231 on Map II,** ½ mile southeast of Graydon, the Lower Douglas Coal is only 9 inches in thickness and slaty, 3 feet above the top of the Upper Nuttall Sandstone, at an elevation of 1755′ B., as determined by the author at its crop in the public road. It is only 6 inches thick and slaty at **Coal Exposure No. 232 on Map II,** in the public road, 1.8 miles northeast of Graydon and 1.3 miles southeast of Mountain Cove P. O., at an elevation of 1715′ B., as determined by the author.

In **Kanawha District** this coal has practically the same development as in Mountain Cove and its roof shale (Douglas) carries the same type of fossil shells. The following data were obtained at its outcrop on the east bank of Loop Creek, 0.8 mile north of Page and 0.1 mile north of the mouth of Robinson Branch:

Coal Exposure No. 233 on Map II.

			Feet.
Shale, dark, sandy, visible....	4′ 0″	**Douglas**	9
Shale, black, hard, with **Lingula** fossil shells..........	1 0		
Shale, sandy.................	4 0		
Coal	0′ 6″	**Lower Douglas (1110′ B.)**..........	2.2
Shale, black.	0 10		
Coal	0 10		
Shale, sandy.......................................			8
Concealed to top of Upper Nuttall Sandstone...........			7

Southward 5.7 miles in the same District, at **Coal Exposure No. 234 on Map II,** the Lower Douglas Coal is only 6 inches thick and slaty at an elevation of 1474′ B., 5 to 10 feet above the top of the Upper Nuttall Sandstone, in the public road, ¾ mile N. 30° W. of Mossy, as determined by the author.

In **Fayetteville District,** 2.2 miles southeastward, the following data were obtained at **Coal Exposure No. 235 on Map II,** in the hill road, 0.4 mile southwest of the Lick Fork Schoolhouse:

	Feet.
Sandstone, **Lower Dotson,** coarse, brown, and friable, from road summit......................	35
Concealed	10
Shale, **Douglas,** buff and sandy..................	25
Coal blossom, Lower Douglas (1610′ B.)..........	1
Concealed, mostly **Upper Nuttall Sandstone**......	105
Sandstone, **Lower Nuttall,** grayish-white, conglomerate, visible............................	32

About 7 miles northeastward in the same District, at **Coal Exposure No. 236 on Map II,** in the road, 1 mile slightly east of north of Oak Hill, the Lower Douglas Coal is less than 1 foot in thickness at an elevation of 1980′ B., about 480 feet above the Sewell Coal bed, as determined by the author.

It is evident from the foregoing data that this coal is too thin and impure to be classed as minable, but it is of interest as being the lowest member of the Kanawha Group thus far named and described in West Virginia.

AGE OF THE KANAWHA GROUP.

Fossil Flora.

The age of the Kanawha Group is probably contemporaneous with that portion of the Pottsville Series of western Pennsylvania that lies above the roof shales of the Sharon Coal, since it has been established beyond doubt that the latter bed belongs in the New River Group at very probably the Sewell Coal horizon, as tentatively indicated in the Rowlesburg (Preston County) Section, published in this Chapter, pages 237-239. Dr. David White, Chief Geologist of the United States Geological Survey, has made a careful study of the fossil flora of several members of this group as it is represented in the Kanawha Valley region of West Virginia, and the results of his investigations, as published in the Bulletin of the Geological Society of America, Volume XI, March, 1900, pages 157-169, are republished and discussed by I. C. White in Volume II of the State Geological Survey, pages 325-8 and 593-603, to which the reader is referred.

Fossil Fauna.

Fossil shells, indicating either marine or brackish-water deposition, have thus far been found at 12 different horizons in the Kanawha Group as shown below, the figures in the right-hand column expressing intervals in feet below the top of the Kanawha Group as exhibited in the General Section of the Pottsville Series published in Chapter IV, pages 100-111.

Table of Marine Fossil Horizons, Kanawha Group.

	Intervals. Feet.
Kanawha Black Flint	100
Buffalo Creek Limestone (may be Winifrede)	435
Winifrede Limestone	535
Dingess Limestone and Shale	760
Seth Limestone	820
Campbell Creek Limestone	1117
Stockton (Cannelton) Limestone and Shale	1240
Roof Shale of Eagle Coal bed	1360

	Intervals. Feet.
Roof Shale of Little Eagle Coal bed	1480
Eagle Limestone and Shale	1544
Gilbert Shale (Dorothy Limestone)	1815
Douglas Shale	2075

W. Armstrong Price, Paleontologist for the State Survey, has made collections of fossil shells from all these members since the year 1913. The following tables, taken from pages 678-679, inclusive, of the Raleigh County Report, exhibit not only the geographic distribution and stratigraphic range of the fossils of the latter Report, but also a list of the invertebrate fossils from the Pottsville Series of the State, compiled from previous Reports of the West Virginia Geological Survey.

In these tables, the following abbreviations are used: "a," abundant; "aa," very abundant; "c," common (where no symbol follows the description of the locality, the species is rare):

List of Invertebrate Fossils from the Pottsville Series of West Virginia.

SPECIES	Kanawha Group											New River Group	Pocahontas Group		
	Kanawha Black Flint	Buffalo Creek Limestone	Winifrede Limestone	Dingess Limestone	Seth ls.	Campbell Creek ls.	Cannelton (Stockton) ls	Roof sh. of Eagle Coal	Roof sh. of Little Eagle Coal	Eagle ls.	Gilbert (Dorothy) sh.	Douglas sh.	Royal sh.	Roof sh. of Pocahontas Coal No. 3	North Fork sh.
Clionolithes canna sp. nov	...	...	*	...	...	...	...	...	...	...	...	...	...	...	...
Enchostoma elkensis Price	*	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Enchostoma sp.	*	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Vermes incerti	*	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Spirorbis (Microconchus) pusillus (Martin)	...	...	...	...	...	...	...	...	*	...	...	...	...	...	...
Spirorbis sp.	*	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Crinoidea indeterminata	...	...	*	c	*	*	...	...	...	...	...	...	...	...	...
Bryozoa indeterminata	...	...	*	...	...	...	...	...	...	...	...	...	...	...	...
Lingula kanawhensis Price	*	...	...	...	*	*	*	aa	...	...	*	*	...	...	...
Lingula umbonata Cox	*	...	...	...	...	...	...	...	...	*	...	...	...	...	...
Lingula lemniscata sp. nov	...	...	...	...	...	...	...	...	...	*	...	...	...	...	...
Orbiculoidea missouriensis (Shumard)	...	...	*	...	...	...	...	...	*	*	...	...	...	...	...
Orbiculoidea capuliformis (McChesney)	*	*	*	*	...	*	...	...	...	*	...	...	...	...	...
Crania modesta White and St. John	...	...	...	*	...	...	...	...	...	...	...	...	...	...	...
Schizophoria altirostris (Mather)	...	...	*	...	...	...	...	...	...	*	...	...	...	...	...
Schizophoria resupinoides (Cox) ?	...	...	*	...	...	...	...	...	...	*	...	...	...	...	...
Derbya crassa (Meek and Hayden)	*	*	aa	*	*	...	...	...	...	*	...	...	...	...	...
Derbya robusta (Hall)	*	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Chonetes granulifer Owen	*	*	*	*	...	...	...	...	...	*	...	...	...	...	...
Productus semireticulatus (Martin)	?	*	*	*	*	...	...	...	...	...	...	...	...	...	...
Pruductus cf. cora d'Orbigny	*	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Productus nodosus Newberry	...	*	...	c	*	...	...	...	...	?	...	...	...	...	...
Productus sp.	...	...	...	*	...	...	...	...	...	...	...	...	...	...	...
Pustula nebraskensis (Owen)	...	...	...	*	...	...	...	...	...	...	...	...	...	...	...
Pustula symmetrica (McChesney)	cf.	*	...	*	?	...	...	...	...	...	...	...	...	...	...
Marginifera wabashensis (Norwood and Pratten)	...	*	*	c	*	...	...	...	...	*	...	...	...	...	...
Spirifer boonesis Swallow ?	c	*	c	c	*	...	...	...	...	*	...	...	...	...	...
Spiriferina kentuckyenis (Shumard)	...	...	*	...	...	...	...	...	...	*	...	...	...	...	...
Hustedia multicostata var. virginiana var. nov	...	...	*	...	...	...	...	...	...	*	...	...	...	...	...
Composita subtilita (Hall)	*	...	*	...	*	...	...	...	...	*	...	...	...	...	...
Composita sp.	...	...	...	c	...	...	...	...	...	...	...	...	...	...	...
Solenomya radiata Meek and Worthen	...	...	...	...	...	...	...	...	...	*	...	...	...	...	...
Sanguinolites raleighensis sp. nov	...	...	...	...	...	...	...	...	...	...	*	...	...	...	...
Prothyris carinata sp. nov	...	...	...	...	...	...	...	...	...	*	*	...	...	...	...
Solenopsis solenoides (Geinitz)	...	...	...	...	...	...	...	...	...	*	...	...	...	...	...
Chaenomya leavenworthensis (Meek and Hayden)	*	...	...	...	*	...	...	...	...	...	...	...	...	...	...
Edmondia gibbosa (M'Coy)	...	...	...	...	*	...	...	...	...	*	...	...	...	...	...
Edmondia sp.	*	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Nucula anodontoides Meek ?	...	...	...	...	...	...	...	...	...	*	...	...	...	...	...
Nucula parva McChesney	*	...	?	...	?	...	...	...	...	?	...	...	...	...	...
Leda arata (Hall)	...	...	...	*	...	...	...	...	...	*	...	...	...	...	...
Leda meekana Mark	...	...	...	*	*	...	...	...	...	*	...	...	...	...	...
Parallelodon sangamonensis (Worthen)	*	...	...	...	...	...	...	...	...	...	...	...	...	...	...

List of Invertebrate Fossils from the Pottsville Series of West Virginia—(Continued).

SPECIES	Kanawha Group											New River Group	Pocahontas Group		
	Kanawha Black Flint	Buffalo Creek Limestone	Winifrede Limestone	Dingess Limestone	Seth ls.	Campbell Creek ls.	Cannelton (Stockton) ls.	Roof sh. of Eagle Coal	Roof sh. of Little Eagle Coal	Eagle ls.	Gilbert (Dorothy) sh.	Douglas sh.	Royal sh.	Roof sh. of Pocahontas Coal No. 3	North Fork sh.
Parallelodon sp.	...	...	...	...	...	...	...	...	...	*	...	....	...	...	...
Aviculipinna americana Meek	...	...	...	...	*	...	...	...	...	...	...	....	...	...	...
Myalina perniformis Cox	...	...	...	...	...	...	?	...	*	...	...	....	...	...	...
Myalina subquadrata Shumard	*	...	...	...	...	...	...	...	...	...	...	....	...	...	...
Naiadites elongata Dawson	...	...	...	*	*	...	...	...	...	...	...	....	*	*	*
Schizodus affinis Herrick	*	...	...	...	...	...	...	...	...	*	...	....	...	...	...
Schizodus cuneatus Meek	...	...	...	...	*	...	...	...	...	...	...	....	...	...	...
Aviculipecten pellucidus Meek and Worthen	...	...	*	...	...	...	...	...	...	...	...	....	...	...	...
Deltopecten occidentalis (Shumard)	...	...	...	...	*	...	...	...	...	...	...	....	...	...	...
Deltopecten eaglensis sp. nov.	...	...	–	...	...	...	...	...	...	*	...	....	...	...	...
Deltopecten flabellum sp. nov.	...	...	...	...	...	...	*	...	*	...	*	....	...	...	...
Deltopecten sp.	...	...	...	...	...	...	...	...	...	*	...	....	...	...	...
Pectenoidea	*	...	...	...	...	...	...	...	...	...	...	....	...	...	...
Lima retifera Shumard	...	...	...	...	...	...	...	...	...	?	...	....	...	...	...
Allerisma terminale Hall	*	...	...	...	...	...	...	...	...	...	...	....	...	...	...
Allerisma guyandotensis sp. nov.	...	...	...	?	*	...	...	...	...	c	*	....	...	...	...
Astartella concentrica (Conrad)	*	...	c	...	...	...	...	...	...	*	...	....	...	...	...
Astartella gurleyi White	...	...	...	*	...	...	...	...	...	...	...	....	...	...	...
Pelecypoda indeterminata	...	...	...	...	...	...	...	...	*	*	...	....	...	...	...
Minute pelecypods	...	...	*	...	...	...	...	...	...	...	...	....	...	...	...
Plagioglypta meekana (Geinitz) ?	...	...	...	...	...	...	...	...	...	...	*	....	...	...	...
Bellerophon crassus var. wewokanus Girty	...	...	...	...	*	...	...	...	...	*	...	....	...	...	...
Euphemus carbonarius (Cox)	?	...	...	...	...	...	...	...	...	*	...	....	...	...	...
Pleurotomaria carbonaria Norwood and Pratten	?	...	...	...	...	...	...	...	...	...	...	....	...	...	...
Phanerotrema grayvillense (Norwood and Pratten)	...	...	...	...	...	...	...	...	...	?	...	....	...	...	...
Schizostoma catilloides (Conrad)	...	...	*	...	...	...	...	...	...	*	...	....	...	...	...
Strophostylus nanus (Meek and Worthen)	...	...	...	...	...	...	...	...	...	*	...	....	...	...	...
Sphaerodoma sp.	*	...	...	...	...	...	...	...	...	...	...	....	...	...	...
Aclisina stevensiana (Meek and Worthen)	...	...	...	...	...	...	...	...	...	...	*	....	...	...	...
Aclisina conditi Meek ?	...	...	...	...	...	...	...	...	...	...	*	....	...	...	...
Aclisina sp.	...	...	...	...	...	...	...	...	...	...	*	....	...	...	...
Conularia crustula White ?	*	...	...	*	...	...	...	...	...	...	...	....	...	...	...
Gastropoda indeterminata	...	...	...	...	...	...	...	...	...	...	...	a	...	...	*
Orthoceras sp.	*	...	...	...	...	...	...	...	...	...	...	....	...	...	...
Pseudorthoceras knoxense (McChesney)	?	...	...	...	...	...	...	...	...	...	...	....	...	...	...
Nautiloidea indeterminata	...	...	*	...	...	...	...	...	...	...	...	....	...	...	...
Tainoceras occidentalis (Swallow)	?	...	...	...	...	...	...	...	...	...	...	....	...	...	...
Branchiata ? indeterminata	...	...	...	...	*	...	*	...	...	...	...	....	...	...	...
Griffithides scitulus (Meek and Worthen)	...	...	...	*	...	...	...	...	...	...	...	....	...	...	...
Ostracoda indeterminata	...	...	*	...	...	...	...	...	...	...	...	....	...	...	*
Pisces indeterminata	...	...	...	...	...	...	...	...	...	...	*	....	...	...	...
Cladodus sp.	...	...	...	*	...	...	...	...	...	...	...	....	...	...	...

Table of Range and Distribution of Fossils.

SPECIES	LOCALITIES																																								Conemaugh Series	Pottsville Series												
																																										Kanawha Group									New River Group	Pocahontas Group		
	33	63	67	68	71	72	73	74	75	76	79	80	81	82	83	84	85	87	108	109	110	111	112	113	114	117	118	119	120	121	122	124	125	126	127	128	129	130	131	140	141	Brush Creek ls.	Winifrede ls.	Dingess ls.	Seth ls.	Campbell Creek ls.	Cannelton (Stockton) ls.	Roof sh. of Eagle Coal	Roof sh. of Little Eagle Coal	Eagle ls.	Gilbert sh.	Douglas sh.	Royal sh.	Roof sh. of Pocahontas No. 3 Coal	North Fork sh.
Chonolithes canna sp. nov.	*																							*																		*	*												
Spirorbis (Microconchus) pusillus (Martin)									*																								a															*						a
Crinoidea indeterminata				*																				*	*																*		*		*	*									
Bryozoa indeterminata																							*																			*												
Lingula kanawhensis Price							aa		aa		aa			aa	aa						aa				*															a					*	*	aa	aa			*	aa			
Lingula lemiscata sp. nov.											aa																																						*					
Orbiculoidea missouriensis (Shumard)		c								*														c																			*						*	*					
Orbiculoidea capuliformis (McChesney)		c										c												*																	*		*			*				*					
Crania modesta White and St. John			*																																									*											
Schizophoria altirostris (Mather)		aa																						aa																			*							*					
Schizophoria resupinoides (Cox) ?		a																						*																			*							*					
Derbya crassa (Meek and Hayden)		a		*																				aa	a																		a		*					*					
Chonetes granulifer Owen		c																						a																										*					
Productus semireticulatus (Martin)																								a	*																				*										
Productus nodosus Newberry		?	*									?													aa						c													*	*					?					
Productus sp.			*																																									*											
Pustula symmetrica (McChesney) ?																									*																				*										
Marginifera wabashensis (Norwood and Pratten)		aa																						aa	*																		*		*					*					
Spirifer boonensis Swallow ?		c		*																				c	a														*				c		*					*					
Spiriferina kentuckyensis (Shumard)		*																						a																			*							*					
Hustedia multicostata var. virginiana var. nov.		*																						a																			*							*					
Composita subtilita (Hall)		a		*																		*		a																			*		*					*					
Solenomya radiata Meek and Worthen												*																																						*					
Sanguinolites raleighensis sp. nov.																																				*															*				
Prothyris carinata sp. nov.																*																				*														*	*				
Solenopsis solenoides (Geinitz)								*																																										*					
Chaenomya leavenworthensis (Meek and Hayden)																									*																				*										
Edmondia gibbosa (M'Coy)		*																							a																				*					*					
Nucula anodontoides Meek ?												*															*																							*					
Nucula parva McChesney ?				*																					*		*																*		*					*					
Leda arata (Hall)								*									*											*																*						*					
Leda meekana Mark		*										c													c		*	*				*												*	*					c					
Parallelodon sp.		*																																																					
Aviculipinna americana Meek																									c																				*										
Myalina perniformis Cox							?			c																																					?								
Naiadites elongata Dawson					*														aa				*		c								aa	aa										*	*								*	*	*
Schizodus affinis Herrick		*																																																*					
Schizodus cuneatus Meek																									a																				*										
Aviculipecten pellucidus Meek and Worthen				*																																							*												
Deltopecten occidentalis (Shumard)																									a																				*										
Deltopecten eaglensis sp. nov.		*																						*																			*							*					
Deltopecten flabellum sp. nov.							a		*	a																									*														*		*				
Deltopecten sp.						*																																												*					
Lima retifera Shumard ?												*																																						*					
Allerisma guyandotensis sp. nov.								*				*					*	*				*			*	*	*			?						*	*	*						*	*					c	*				
Astartella concentrica (Conrad)		a		*								?												c																			c							*					
Pelecypoda indeterminata										*																			*																				*	*					
Minute pelecypods																								*																			*												
Plagioglypta meekana (Geinitz) ?																																				*															*				
Bellerophon crassus var. wewokanus Girty																									a																				*										
Phanerotrema grayvillense (Norwood and Pratten) ?		*																																																*					
Schizostoma catilloides (Conrad)		a																						*																			*							*					
Aclisina stevensiana (Meek and Worthen)													*																																						*				
Aclisina conditi Mark ?													*																																						*				
Aclisina sp.													*																																						*				
Gastropoda indeterminata																																		c																		*			*
Nautiloidea indeterminata																								*																			*												
Branchiata ? indeterminata							*														*																						*		*								
Ostracoda indeterminata																								aa										a									*												*
Pisces indeterminata													c																																						*				

"Register of Localities.

"The following list includes all the localities in Raleigh, Wyoming and McDowell Counties from which fossils have been collected by the writer, (Dr. W. A. Price), together with those localities, in the area named, from which collections made by other members of the Survey Staff have been studied. Localities in adjoining and neighboring counties from which fossils are described in this Report are also included. An asterisk (*) denotes the localities from which collections have been studied for this Report:

33.* Preston County, Valley District, Kingwood Turnpike, 2.1 miles east of Reedsville, 2170′ B-A. T., roadside. Conemaugh Series, Brush Creek Limestone.

63.* Fayette County, Kanawha District, C. & O. R. R. cut at grade 1.1 miles south of mouth of Smithers Creek, on west bank of Kanawha River, ½ mile north of town of Eagle, 642′ L-A. T. (Type Locality), Edgewater tipple. Kanawha Group, Eagle Limestone.

67.* Kanawha County, Cabin Creek District, hillside at Winifrede Junction, 837′ L-A. T., Kanawha Group, Dingess Limestone.

68.* Kanawha County, Cabin Creek District, North Hollow of Fields Creek, 0.1 mile east of mouth of South Hollow, in town of Winifrede, 970′ B-A. T., but not in place. (Type Locality), Kanawha Group, Winifrede Limestone.

71.* Mercer County, Virginian R. R. cut 100 yards east of station at Matoaka, Pottsville Series, Pocahontas Group, North Fork Shale.

72.* Wyoming County, Oceana District, north bank of Road Fork of Huff Creek, at its mouth at Swope, 1190′ B-A. T., 8 feet above public road. Kanawha Group, Eagle Shale.

73.* Wyoming County, Oceana District, Huff Creek, 0.5 mile north of mouth of Laurel Branch, 1.4 miles south of cornering of Wyoming-Logan-Boone Counties, 1580′ B-A. T. Kanawha Group, Cannelton Limestone (Matewan Coal roof).

74.* Logan County, Triadelphia District, 0.8 mile west of mouth of Sandlick Branch of Huff Creek, and near Cyclone P. O., shale under very prominent projecting ledge of sandstone, 830′ B-A. T. Kanawha Group, Eagle Shale.

75.* Wyoming County, Clear Fork District, Walls Branch of Clear Fork of Guyandot River, 0.65 mile northwest of mouth of the branch, 1255′ B-A. T., old coal opening east side of branch, Kanawha Group, Gilbert Shale.

76.* Wyoming County, Clear Fork District, Cedar Creek of Clear Fork of Guyandot, 2.2 miles north of mouth of the creek, 1645′ B-A. T. Kanawha Group, Little Eagle Coal roof.

77. Wyoming County, Huff Creek District, public road, head of Little Cub Creek, 0.6 mile southwest of Botsford, 1435′ B-A. T. Kanawha Group, Eagle Shale.

78. Wyoming County, Oceana District, 2005′ B-A. T., on hill north of Clear Fork, on trail leaving public road 0.4 mile northwest of Crany P. O. Kanawha Group, Eagle Shale.

79.* Wyoming County, Oceana District, 0.1 mile northwest of Clear Fork Gap on Guyandot Mountain, old coal mine side of road, 2570′ B-A. T. Kanawha Group, Cannelton Limestone (Matewan Coal roof).

80.* Raleigh County, Trap Hill District, roadside 0.15 mile east of Clear Fork Gap on Guyandot Mountain, 2630′ B-A. T. Kanawha Group, Eagle Limestone.

81.* Wyoming County, Oceana District, 0.1 mile north of mouth of Knob Fork of Clear Fork of Guyandot River, west side of stream 0.2 mile west of Knob Fork School, 1940′ B-A. T., coal drift, Kanawha Group, Gilbert Shale.

82.* Wyoming County, Slab Fork District, Otter Fork of Laurel Fork of Clear Fork of Guyandot River, 0.7 mile above mouth of the stream, 1990′ B-A. T., coal drift. Kanawha Group, Douglas Shale (Lower Douglas Coal roof).

83.* McDowell County, Sandy River District, 1005′ B-A. T., on road on point west side of Shortpole Branch of Tug Fork of Big Sandy River, at mouth of branch. New River Group, Douglas Shale, (Lower Douglas Coal roof shale).

84.* Mingo County, Stafford District, 1280′ B-A. T., on hillside 0.25 mile north of mouth of Fourpole Creek of Tug Fork of Big Sandy River, Kanawha Group, Eagle Limestone.

85.* Mingo County, Stafford District, Turkey Creek, 0.6 mile northeast of mouth of Star Fork, 1233′ L-A. T., ditch on hill east side creek above mine pump house. Kanawha Group, Eagle Shale.

86. McDowell County, Sandy River District, Left Fork of Road Fork of Bull Creek, 4 miles southwest of Panther, roadside. 1500′ B-A. T. Kanawha Group, Eagle Shale fossils.

87.* Mingo County, Magnolia District, cut of N. & W. R. R., 755′ L-A. T., ½ mile east of Delorme Station and at north end of railroad bridge over Tug Fork (at U. S. G. S. B. M. "727") to Freeburn Colliery. Kanawha Group, Eagle Shale.

88. Roof shale of Little Cedar Coal at above locality, and probably to be considered the lowest portion of the Eagle Shale.

108.* Raleigh County, Shady Spring District, 1920′ B-A. T., Royal Mining Company's plant at Royal. Pocahontas Group. Royal Shale (Type Locality).

109.* Raleigh County, Clear Fork District, C. & O. R. R. cut, 960′ L-A. T., just west of Four States Mining Company's plane at Dorothy Mine, Dorothy. Kanawha Group, Dorothy Shale. (Type Locality) (Gilbert Shale).

110.* Raleigh County, Clear Fork District, 1243′ L-A. T., Dorothy Mine plane, Dorothy, Kanawha Group, Eagle Coal roof shale.

111.* Raleigh County, Clear Fork District, 1531′ L-A. T., Dorothy Mine plane, Dorothy, Kanawha Group, Seth Limestone.

112.* Raleigh County, Clear Fork District, 1601′ L-A. T., Dorothy Mine plane, Dorothy, Kanawha Group, Dingess Shale (2 layers).

113.* Raleigh County, Clear Fork District, 1805′ L-A. T., Dorothy Mine plane, Dorothy, Kanawha Group, Winifrede Limestone and Shale.

114.* Boone County, Sherman District, C. & O. R. R. cut, 0.8 mile west of High Coal, and just north of a fill over a creek flowing into Seng Creek from the southeast, Kanawha Group, Seth Limestone.

117.* Mingo County, Lee District, town of Williamson, hillside south of Williamson Creek, coal mine of Superior Thacker Coal Co., 0.25 mile east of mouth of creek, Kanawha Group, Dingess Limestone.

118.* Buchanan County, Virginia, Rock Lick District, ridge opposite mouth of Turkey Creek at War Eagle, Mingo County, Stafford District, W. Va., 0.3 mile west from mouth of creek, 1275′ B-A. T., Kanawha Group, Eagle Shale.

119.* Mingo County, Magnolia District, 0.5 mile northwest of mouth of Mate Creek at Matewan, 1205′ B-A. T., hillside north of Matewan, Kanawha Group, Dingess Limestone.

120.* Logan County, Triadelphia District, east side of Guyandot River hillside above public road, 810′ B-A. T., 0.3 mile northeast of mouth of Sandlick Branch and 3.4 miles south of Man, Kanawha Group, Eagle Shale.

121.* Mingo County, Stafford District, ridge east of Glenalum Junction on N. & W. R. R., 1055′ B-A. T., over the railway tunnel, 0.2 mile north of the Junction, Kanawha Group, Eagle Shale.

122.* Boone County, Crook District, west bank of Casey Creek, 0.3 mile above its junction with Pond Fork on point south of mouth of first right-hand branch of the creek, 895′ B-A. T., Kanawha Group, Dingess Limestone.

124.* Lincoln County, Harts Creek District, north of road along Big Ugly Creek, 0.7 mile east of mouth of Trace Branch, and 0.1 mile west of junction of this road and secondary road up hill to head of Lukey Fork of Mud River, and 0.2 mile from Boone County Line, 935′ B-A. T., Kanawha Group, Dingess Limestone.

125.* Raleigh County, Slab Fork District, Tommy Creek; coal outcrop in north bank of creek, 2.4 miles west of Odd, Pocahontas Group, roof shales of No. 3 Coal.

126.* McDowell County, North Fork District, 1700′ B-A. T., north side of Elkhorn Creek at North Fork Station on N. & W. R. R. cut just west of railroad bridge over Elkhorn Creek, 0.2 mile below mouth of North Fork, Pocahontas Group, North Fork Shale. (Type Locality).

127.* Wyoming County, Oceana District, hillside northwest of Oceana, 1615′ B. coal prospect, 0.3 mile from crossing of county road over Dry Branch, Kanawha Group, Little Eagle Coal, roof shale.

128.* Raleigh County, Trap Hill District, roadside 0.5 mile east of Clear Fork Gap on Guyandot Mountain, 2335′ B-A. T., Kanawha Group, Gilbert Shale.

129.* Wyoming County, Oceana District, hillside above Laurel Fork, 0.9 mile southwest of mouth of Clear Fork, 1725′ B-A. T., not in place, Kanawha Group, Eagle Shale.

130.* Raleigh County, Marsh Fork District, Peachtree Ridge, northern end, 0.4 mile west of Dry Creek P. O., west side of hollow in end of ridge, Kanawha Group, Gilbert Shale.

131.* Raleigh County, Marsh Fork District, Indian Gap, southeast of gap on hillside, 2655′ B-A. T., 50 yards southeast of gap and 27′ B. above gap, Kanawha Group, 'Indian Gap Limestone,' Winifrede Limestone?

140.* Fayette County, Kanawha District, town of Crescent, '3 feet over Campbell Creek Coal', Pottsville Series, Kanawha Group, Campbell Creek Limestone.

141.* Boone County, Sherman District, mouth of Stover Branch of Coal River in road bank, 2 horizons 18 feet apart, Kanawha Group, Campbell Creek Limestone."

On November 8, 9, and 10, 1917, the writer, (Dr. Wm. Armstrong Price), spent parts of three days in the vicinity of the village of Chattaroy, Mingo County, in the endeavor to locate the Winifrede Limestone on the waters of Buffalo Creek and to determine the nature of its fossil-content and the relation of the limestone to the coal seams mined there.

Two sections were measured. In the section at the mouth of Buffalo Creek a fossiliferous limestone was found 60 feet beneath the Buffalo Creek Coal. Only one shell was found in this limestone which is referred to **Spirifer boonensis.** In the section measured 0.8 mile northeast of the mouth of the creek, one mile northeast of the first section, a mass of highly fossiliferous black shale was discovered apparently overlying a coal bed but having slid down the steep hillside from its original position. The original position of the shale and coal was not determined with certainty.

The slipped material appeared to have come from a point 85 to 95 feet beneath the Buffalo Creek Coal. No trace of the fossiliferous limestone seen at the mouth of the creek was found. If this limestone is the Winifrede Limestone of Winifrede, Kanawha County, and Dorothy, Raleigh County, a fossiliferous shale would be expected beneath it.

Until further investigation of this region is accomplished the relation of the fossiliferous shale and limestone in this area remains uncertain. Consequently, little light is shed upon the question of the correlation of the coals.

Section at mouth of Buffalo Creek, Hardee District, Mingo County, (Locality 176), measured from the top of a high knob at the western end of the ridge between Buffalo and Sugartree Creeks, descending the ridge to the northwest, past the mine of the Standard Thacker Coal Company in the Williamson Coal bed, to the N. & W. R. R. grade on Tug Fork of Big Sandy River (elevation 650′ L., A.T.) at a point 0.3 mile southwest of the mouth of Buffalo Creek. Section measured with aneroid barometer. Interval between Buffalo Creek Limestone and Buffalo Creek Coal determined by hand-level. Position of top of Buffalo Creek Coal in its bench supplied from an opening in this coal of the Frederick Mine of the Howard Colliery Company about 800 feet east of the section in a direction parallel to the strike of the strata and in the same hill.

		Thickness. Feet.	Total. Feet.
1.	Sandstone, massive, **Homewood**, and concealed from top of knob	75	75
2.	Sandstone, massive, **Upper Coalburg**	75	150
3.	Concealed in bench (Coalburg Coal horizon)	15	165
4.	Sandstone, massive, **Lower Coalburg**	66	231
5.	**Coal, Buffalo Creek,** (supplied from mine of Howard Collieries Co., on the strike, near by	4	235
6.	Concealed in long gentle slope; shale and some thin sandstone outcrops; sandstone ripple-marked. (Thickness determined by hand-level)	50	285
7.	Concealed in steep slope below bench	10	295
8.	Limestone, Buffalo Creek, hard, bluish-gray, highly siliceous and containing abundant small coal fragments showing the form of plant stems, pieces of wood, giving the rock the appearance of a breccia. (Sandstones in unit No. 10 are identical with this bed in all features except lime content.) **Spirifer boonensis?** and fragments of brachiopod shells, possibly all of this species, were found sparingly in the limestone, 1' 6" to	1	296
9.	Concealed in steep slope	24	320
10.	Shaly sandstone, light-brown alternating with beds of soft brown shale and concealed; plant fragments abundant; steep slope; (Much sliding has taken place here). Thickness determined by hand-level	42	362
11.	Concealed in gentle slope. (Thickness determined by hand-level)	13	375
12.	Concealed in steep slope. (Thickness determined by hand-level)	10	385
13.	Concealed in bench. (Thickness determined by hand-level)	5	390
14.	Concealed, with shaly sandstone and hematite nodules in soil (Upper Chilton Sandstone); prominent bench at top. (Thickness determined by hand-level)	36	426
15.	Coal blossom, Chilton Coal	0	426
16.	Concealed in medium slope; fragments of shaly sandstone, bearing plant fossils, appear in soil with nodules of hematite (Lower Chilton Sandstone)	29	455
17.	Concealed in low slope; bench of Little Chilton Coal horizon	15	470
18.	Concealed in steeper slope; sandstone outcrops at top, **Hernshaw Sandstone**	35	505
19.	Concealed in medium slope (probably containing **Hernshaw Coal**)	10	515
20.	Concealed in gradually steepening slope, passing to sandstone above (probably containing horizon of Dingess Coal about middle of the unit	75	590
21.	Thin-bedded sandstone, alternating with sandy shale and soft argillaceous shale	15	605

		Thickness. Feet.	Total. Feet.
22.	Concealed in gentle slope (probably contains Dingess Limestone horizon)	21.5	626.5
23.	Coal, **Williamson Coal**, (3′ 6″ reported) Mine of Standard Thacker Coal Co.	3.5	630
24.	Concealed in steep slope (Upper Cedar Grove Sandstone horizon in part)	70	700
25.	Sandstone and concealed in steep slope below public road grade (Middle Cedar Grove Sandstone horizon in part)	25	725
26.	Concealed in slope (Lower Cedar Grove Sandstone horizon)	43	768
27.	Alma Coal in prospect of Standard Thacker Coal Co.	2	770
28.	Concealed in slope to Norfolk and Western R. R. grade at tipple of Standard Thacker Coal Co.'s mine (650′ L.)	30	800

Section on Buffalo Creek, (Locality 177), Hardee District, Mingo County, beginning at the mine of the Buffalo Collieries Company, elevation 1248′ barometer, (No. 23 on Map II, West Virginia Geological Survey, Logan and Mingo Counties Report; see also page 386); and descending in a southerly direction along the plane of the mine to the grade of a branch line of the N. & W. R. R. on Buffalo Creek at a point 0.8 mile northeast of the mouth of the creek. Measured by aneroid barometer.

		Thickness. Feet.	Total. Feet.
	Sandstone, massive, variable in thickness, in places cutting out coal beneath.		
1.	Coal, "Buffalo Creek", Mine No. 23, about	5	5
2.	Concealed and sandstone on steep slope with some inconspicuous benches	80	85
3.	Concealed in gentle slope and probably containing the stratum **of black fossiliferous shale** from which a loosened mass has slid down to the foot of this unit. Beneath the fossiliferous shale is a red ash from the burning of a coal which seems to have underlain the shale	20	105
4.	Concealed and sandstone in steep slope; some beds weathered shaly	20	125
5.	Concealed in bench, many red hematite chips in soil	15	140
6.	Sandstone, argillaceous, and concealed, with some shale	15	155
7.	Sandstone, massive	15	170
8.	Concealed in steep slope	25	195
9.	Coal blossom, Chilton Coal ("Tayloyr Seam")	0	195
10.	Shale, soft, sandy, brown; containing a few plant remains; **cf. Annularia**, and fern-like fronds	5	200
11.	Sandstone, thick-bedded, weathered friable, containing **Cordiates**	20	220
12.	Coal blossom, Lower Chilton (13″)	0	220

PLATE X(a).—View looking northeast from road summit, 1¼ miles northeast of Ravenseye, showing corn and buckwheat in shock on left and farms typical of plateau region of Fayette County.

PLATE X(b).—View looking northwest from Gatewood across plateau upheld by Upper Nuttall Sandstone, the mountain ridge on sky-line being in Kanawha Group and 3 miles west of Fayetteville.

		Thickness. Feet.	Total. Feet.
13.	Clay shale, white, (1')	1	221
14.	Shale, sandy	14	235
15.	Sandstone, massive, some beds weathering shaly	40	275
16.	Coal blossom	0	275
17.	Concealed	5	280
18.	Sandstone, massive	14	294
19.	Concealed	6	300
20.	Coal blossom, Dingess Coal	0	300
21.	Sandstone and sandy shale in alternating beds. (Probably containing Digness fossiliferous limestone horizon. Chiefly shale in upper half. **Lepidodendron** abundant)	65	365
22.	Shale, sandy	8	373
23.	Coal blossom, Williamson Coal, (reported 3' 10" as formerly prospected here)	0	373
24.	Shale, sandy	7	380
25.	Concealed and sandstone, weathering thin-bedded, **Upper Cedar Grove**	70	450
26.	Concealed in steep bluff	55	505
27.	Probable horizon of Alma Coal, supplied from an outcrop, 0.5 mile eastward in a direction parallel to the strike	0	505
28.	Concealed in steep bluff, to N. & W. R. R. grade on Buffalo Creek	20	525

DESCRIPTION OF SPECIES.

BRACHIOPODA.

Genus LINGULA Bruguiere.

Lingula lemniscata Price.

Lingula lemniscata. Price, 1916, West Virginia Geological Survey, Report Raleigh and Western Portions of Summers and Mercer Counties, page 691, pl. XXX, fig. 3, Kanawha Group; Eagle Limestone, Raleigh County, West Virginia.

Description.—Minute examples of this tiny species. More elongated than the figured cotype from Raleigh County but similar to other individuals of the species at the type locality.

Measurements of four specimens including the largest of this collection:

Length. m m.	Width. m m.
3.30	2.10
2.60	2.00
2.20	1.40
2.00	1.35

Occurrence—Locality 177.

Pleurophorella sesquiplicata sp. n.

Description.—Shell small, transversely elongate, subrectangular, moderately convex, gibbosity greatest in the anterior and umbonal regions and also along the posterior umbonal slope; cardinal margin straight or very slightly convex; shell abruptly down-folded near the cardinal margin forming a ridge parallel to the hinge line and enclosing a narrow, well-defined, concave escutcheon; posterior umbonal slope carinated, the ridge or carina extending from the beak to the posterior margin at a point situated about two-thirds the height from the ventral margin; posterior margin obliquely truncated from this point to the cardinal margin, sloping slightly forward and meeting the cardinal margin in an obtuse angle; posterior margin rounding below into the ventral margin which is broadly arcuate and sub-parallel to the cardinal margin; between the ridges radiating from the beak along the posterior umbonal slope and near the cardinal border the shell is flattened and crossed by a faint radiating ridge; anterior margin rounded upward to about the mid-height, thence sloping abruptly backward and upward to the beak; anterior to the beaks the lunule is strongly concave, extending backward under them; beak situated about one-sixth the transverse diameter of the shell from the anterior end; ratio of the height to the transverse diameter, approximately 2 to 3—whence the specific name. Shell thin; surface marked with extremely fine, closely placed, concentric striae and with coarser undulations of growth; upon the post-umbonal region the sculpture is somewhat less marked and in some shells the growth lines are here largely obsolete; covering the surface of the entire shell are very minute papillae, arranged more or less definitely in concentric and radiating lines; the granules seem to be larger and more prominent posteriorly.

Interior of the shell marked with the concentric undulations of growth which are weak or absent upon the post-umbonal region where may be seen grooves corresponding to the radiating ridges of the exterior. Muscle markings and pallial line not seen.

Dimensions of four specimens in millimeters:—

Transverse diameter....	7.0	8.0	10.0	12.5
Height	4.5	5.0	6.3	8.0
Half-thickness	...	...	....	2.0

The specimens in hand are casts in a shale matrix of the exterior and interior surfaces of disassociated valves. The beaks are in nearly all cases flattened, obscuring the lunule and escutcheon and making measurements of the thickness untrustworthy.

The presence or absence of a plication on the flattened area between the post-umbonal ridge and the ridge bordering the escutcheon is not clear to me. On about one-half of the shells examined such a fold is well defined, in some cases producing at its end a slight convexity in the posterior margin. In all cases, however, this fold is accompanied by a fracture extending a part or the whole of the length of a fold. On unfractured shells no ridge is apparent. Whether the presence of this fold parallel to the post-umbonal ridge determined the location of the fracture or whether the fracture produced a false fold I am not able to decide. At least one-half of the specimens possess no such fold. The reference of the species to **Pleurophorella** is therefore somewhat doubtful.

That muscle markings were not observed upon the casts may be due to their crushed condition; however, I am inclined to believe that they were not prominently developed. The pallial sinus could not be distinguished from the growth lines.

The sub-rectangular shape, straight hinge line, sub-parallel cardinal and ventral margins, fine sculpture and ratio of height to transverse diameter, when taken together serve to distinguish this from other species referred to this genus, all of which are either posteriorly tapering or have coarser concentric sculpture. An exception to the latter statement is perhaps to be found in **P. papillosa,** the type of the genus, which seems to differ from this species only in its large size and in having the width twice the height.

Occurrence.—Locality 177.

Naiadites carbonaria Dawson?

Naiadites carbonaria, Dawson, Acadian Geology Supp.
Coal measures; South Joggins, Novia Scotia.

Naiadites carbonaria, Dawson, Quart. Jour., Geological Society London, Vol. X, p. 39, pl. 22.
Coal measures: South Joggins, Nova Scotia.

Naiadites (Anthracoptera) carbonaria, Dawson, 1868, Acadian Geology, 2nd edition, p. 204, text fig. 42; and text fig. (page 182).
Coal measures: South Joggins, Nova Scotia.

Description.—A large number of small shell impressions from this collection, mostly imperfectly preserved, which appear to belong to the genus **Naiadites,** present certain differences from the form which has been commonly referred by me to **N. elongata,** to which species I was at first inclined to refer it. The specimens present a range in size from tiny forms measuring less than 2 millimeters in length of hinge to forms five times as long in this dimension. Whether they represent immature forms of **N. elongata** or of **N. carbonaria** I am not positive. The latter is described by Dawson as the larger of the two. The specimens of this collection are smaller than the mature sizes of either species. They are here doubtfully referred to **N. carbonaria** which they more nearly resemble, having a greater length of hinge in proportion to length of valves and a straighter hinge line. The anterior lateral margin shows, in the smaller sizes, a distinct sinuation of the growth lines which indicates the presence of a marginal sinus, rendering the anterior end of the hinge line somewhat alate. As no specimens have come to hand which are unbroken in this portion the marginal configuration is merely inferential.

Occurrence.—Locality 177.

LISTS OF SPECIES.

Collected at Locality 177 from a mass of black shale in a land-slip; the stratum from which the shale had been broken appears to lie from 85 to 95 feet below the Buffalo Creek Coal.

Deltopecten sp	+
Gastropoda indeterminata	+
Phanerotrema grayvillense	a
Naiadites carbonaria ?	aa
Plant fragments	c
Marginifera wabashensis	+
Lingula lemniscata	aa
Orbiculoidea missouriensis	c
Orthoceratida indeterminata	+
Spirifer boonensis ?	+
(From Locality 176, 60 feet below Buffalo Creek Coal.)	
Pleurophorella sesquiplicata, sp. n	aa
Nautilloidea ? indeterminata	+
Solenomya radiata	+
Aviculipecten pellucidus	+
Chonetes granulifer	+
Patellostium montfortianum	+
Enchostoma sp	+
Nucula parva ?	+

CHAPTER VII.

STRATIGRAPHY—THE NEW RIVER GROUP OF THE POTTSVILLE SERIES.

GENERAL ACCOUNT.

The New River Group or Middle Pottsville of White[1], beginning at top with the Nuttall Sandstone and extending down through the rock column to the top of the Flattop Mountain Sandstone, has a thickness ranging from about 800 feet in the western border of the County to about 1000 feet in the southeastern portions of Sewell Mountain and Quinnimont Districts, as against 1030 to 1050 feet for the same measures in southwestern McDowell County, the latter being the region of the maximum development of the several divisions of the Pottsville Series in the State. Attention is here called to the correction in the thickness of the New River beds for the latter County on page 100, in the introduction to the General Section of the Pottsville Series in Chapter IV. In Fayette, the character of the strata differs but little from that in the southern border of the State, generally consisting of heavy to current-bedded sandstones, medium-grained to coarse, pebbly, micaceous to quartzitic, grayish-white to yellowish-brown in color; coal beds, soft and columnar in type; impure fire clays; shales, both argillaceous and arenaceous, buff, gray and black in color, in two different horizons carrying a fossil fauna indicating either marine or brackish-water deposition. Sandstones predominate, constituting 65 to 75 per cent. of the strata. The detailed areal extent of its surface rocks is shown on Map II. The coal beds have the greatest economic importance, the group holding at least two—Sewell and Fire Creek—that attain minable dimensions, purity, and regularity, the descriptions of which are published on subsequent pages of this Chapter and in Chapter XI.

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[1] I. C. White, Vol. II(A), W. Va. Geol. Survey, p. 13; 1908.

The sandstones of this group affect the topography in a more striking manner than those of the Kanawha, in that long and persistent cliff exposures are quite common, this being caused by the fact that these ledges are more siliceous and consequently harder than those of the latter group. The thickness and stratigraphic position of the several members of the New River Group for the southern half of the State are exhibited in the General Section of the Pottsville Series in Chapter IV, pages 106-109, along with those of the Kanawha and Pocahontas Groups. In the same Chapter there are also published many special sections at widely scattered points that show the rock succession of this group.

DESCRIPTION OF MEMBERS, NEW RIVER GROUP.

A detailed description of the members of the New River Group will now be given in the descending order of their occurrence in the General Section of the Pottsville Series, pages 106-109.

THE UPPER NUTTALL SANDSTONE.

The Nuttall Sandstone of Campbell and White[2], constituting the top member of the New River Group at the type locality of the latter in the territory of this Report and coalesced into one great cliff rock just below Hawks Nest, 175 to 200 feet in thickness, is usually represented in Fayette by two separate and distinct ledges of practically the same thickness, generally separated by 5 to 20 feet of dark, sandy shales and sometimes a thin—6 to 18 inches—coal bed (Iaeger "B"). In this Report the name **Upper Nuttall Sandstone** is applied to the upper ledge, and likewise, **Lower Nuttall Sandstone,** for the lower ledge. The former belongs from a few inches to 15 feet below the Lower Douglas Coal and is the topmost member of the New River Group. It appears beyond all reasonable doubt now that the **Panther Sandstone or Conglomerate** of McDowell County, originally described by the author on pages 185-6 of the Wyoming-McDowell Report, correlates with the Upper Nuttall ledge, instead of the latter representing the Dotson Sandstone, these facts being discussed in the introduction to the General Section of the Pottsville Series, page 100.

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[2] I. C. White, Bull. 65, U. S. Geol. Survey, p. 200; 1891; and Vol. II, pp. 616 and 655; 1903; and Vol. II(A), pp. 253-4; 1908; W. Va. Geol. Survey; and M. R. Campbell, Raleigh Folio, No. 77, U. S. Geol. Survey; Dec., 1901.

In Fayette the Upper Nuttall Sandstone is usually heavy-to current-bedded, grayish-white, reddish-gray to brown, seldom pebbly, and forms great cliffs along the valley walls of the Kanawha, New, and Gauley Rivers, ranging from 40 to 100 feet in height, at 5 to 15 feet above the more prominent cliff-maker—the Lower Nuttall ledge. Its thickness and stratigraphic position are exhibited in the sections published in Chapter IV for Falls, Kanawha, Mountain Cove, Nuttall and Fayetteville Districts; in the logs of test wells for oil and gas—Nos. 6A, 9, 10, 11, 12, 18, 20, 23, and 29 on Map II, published in Chapter X; and in the logs of coal test borings Nos. 13, 13A, 14, 16, 29, 37, 38, 75, 86, 87, and 88 on Map II, published in Chapter XI. Its outcrop follows immediately below that outlined on the same map for the Lower Douglas Coal bed. The almost sheer vertical cliffs, just below the town of Hawks Nest and on the north hillside of New River, 175 to 200 feet in height, are formed by the junction of this ledge with the underlying Lower Nuttall Sandstone. It has been worked quite extensively at **Sandstone Quarries Nos. 4, 5, 6, and 7 on Map II,** in the southeast edge of the town of Fayetteville, at elevations ranging from 1790′ to 1825′ B., stone from these being used for building purposes in the latter place, notable examples being the County Jail and the Fayette County National Bank Building. A cut of the latter building is published in this Report. It will readily be seen that stone from this ledge presents an attractive appearance in buildings, either wholly, or for foundations and trimmings. It is medium-grained, quite hard and siliceous and has a marked pinkish-gray caste. That it has very durable qualities is evidenced by its many clean-cut cliffs that have been exposed for ages to the atmospheric agencies.

THE IAEGER "B" COAL.

The Iaeger "B" Coal of the author[3], belonging at its type locality—southwest portion of Sandy River District, McDowell County—100 to 115 feet below the Lower Douglas Coal, 100 feet above the Iaeger bed proper, and ranging in thickness from 12 to 24 inches, appears to be represented in Fayette by a thin and irregular coal bed that is sometimes present, though often absent, in the dark shales separating the Upper and Lower Nuttall Sandstones. No crop exposures of it were observed, but its thickness and stratigraphic position are exhibited in the logs of coal test borings Nos. 14, 16, 29, 34, 68, and 88 on Map II, the details of which are published in Chapter XI. It is too thin and irregular to be classed as minable, features that are characteristic of it at its type locality in McDowell County.

THE LOWER NUTTALL SANDSTONE.

As mentioned above, under the description of the Upper Nuttall ledge, the name **Lower Nuttall Sandstone** is first applied in this Report for the lower member of the Nuttall Sandstone Stage. In Fayette it is usually massive to current-bedded, medium- to coarse-grained, highly siliceous, pebbly to conglomeratic, grayish-white to grayish-brown, ranging in thickness from 75 to 110 feet and frequently forming long lines of sheer cliffs almost 100 feet in height, especially along the valley walls of Gauley River between Swiss and Carnifex Ferry; Meadow River between the latter Ferry and Miller; and New River between Gauley Bridge and Keeney Creek. It is this ledge that forms the falls in the Kanawha River at Kanawha Falls as it dips rapidly northwestward below drainage to emerge again just below the mouth of Gauley River. As it belongs only slightly over 100 feet below the horizon of the Lower Douglas Coal, its outcrop should follow the same interval below that outlined on Map II for the division line between the Kanawha and New River Groups. Its thickness and stratigraphic position are exhibited in the sections published in Chapter IV for scattered points in Falls, Mountain Cove, Nuttall, Kanawha, and Fayetteville Districts; and in the detailed logs of about 30 of the coal test borings, published on subsequent pages in Chapter XI. As shown in the General Section of the Pottsville Series, page 107, it is evidently represented in McDowell County by the **Upper Iaeger Sandstone** of the author[4], belonging in the latter area 10 to 15 feet below the Upper Nuttall (Panther) ledge and 30 to 60 feet above the Iaeger Coal.

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[3] Ray V. Hennen, Wyoming-McDowell Report, W. Va. Geol. Survey, pp. 186-7; 1915.

It is the Lower Nuttall Sandstone that was once quarried by the New River & Pocahontas Consolidated Coal Co., 75 to 100 yards southeastward from its Weirwood Shaft Mine—No. 174 on Map II—at Herberton, at an elevation of 1690′ B., 275 feet above the Sewell Coal bed, the following data being obtained here by the author:

Sandstone Quarry No. 8 on Map II.

			Feet.
Sandstone, soft, friable, reddish-brown in color, visible....................	6′	Lower Nuttall	16
Sandstone, quarry ledge, massive, coarse-grained, grayish-white, with reddish tinge.....................	10		

The above quarry belongs about the middle of the Lower Nuttall Sandstone ledge in its normal development, although the other portions are not exposed at this point. Stone from this quarry was used in the construction of the fan and boiler houses and the foundation for the company store at the mine mentioned above, in all of which it presents a very attractive appearance.

The above is the only quarry observed on the Lower Nuttall Sandstone. Its wide exposures in great hard cliffs should furnish an inexhaustible supply of stone possessing durable qualities in a high degree, and also raw stone for crushing into a high-grade silica sand for the manufacture of glass, as it is very similar in texture and physical appearance to the Upper Raleigh Sandstone which is quarried successfully in Fayette County for this purpose, as described on subsequent pages in Chapter XII.

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[4] Loc. cit., pp. 187-8.

Southeastward of a line across the County via Russellville, Winona, Parral, and Herberton, this sandstone has a tendency to thin down and become much softer and friable, coarser and brown in color, seldom making pronounced cliffs, thus losing its great value as a "key-rock" in conjunction with the Upper Nuttall ledge, northwest of the same line.

The **Iaeger "A" Coal** of the author[5], belonging at its type locality in the southwestern portion of Sandy River District, McDowell County, immediately at the base of the sandstone ("Upper Iaeger") last described and 40 to 70 feet above the Iaeger Coal proper, does not appear to be represented in Fayette.

The **Upper Iaeger Shale** of the author[6], belonging at its type locality—Iaeger, McDowell County—in the interval separating the sandstone last described—Upper Iaeger (Lower Nuttall)—from the underlying Iaeger Coal, is present but of no special economic importance in Fayette County. Its thickness and stratigraphic position are exhibited in the logs of coal test borings Nos. 30, 31, 35, 61, 75, and 89 on Map II, the details of which are published in Chapter XI.

THE IAEGER (HUGHES FERRY) COAL.

The Iaeger Coal of White[7], described more fully by the author on pages 189-190 and 521-535 of the Wyoming-McDowell Report of the State Geological Survey and belonging at its type locality—Iaeger, McDowell County—130 feet above the bed of Tug River of Big Sandy River, 35 to 40 feet above the Lower Iaeger Coal and 225 feet below the Lower Douglas bed, the latter belonging at the base of the Kanawha Group, appears to be very persistent in Fayette and Nicholas Counties and to represent the **Hughes Ferry Coal** of White[8]. The following section was measured at the type locality of the latter in Nicholas County, on the north bank of Gauley River, about 200 yards above the present highway bridge over the latter at the old site of Hughes Ferry:

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[5] Loc. cit., p. 188.
[6] Loc. cit., pp. 188-9.
[7] I. C. White, Vol. II(A), W. Va. Geol. Survey, pp. 251-2; 1908.
[8] Lot. cit., pp. 252-3.

	Ft.	In.
Sandstone, **Lower Nuttall**, massive, pebbly, medium-grained, making great cliff	100	0
Concealed, mostly flaggy sandstone	10	0
Sandstone, flaggy	2	0
Coal, Hughes Ferry (Iaeger) (1580′ B.)	1	2
Shale, gray, visible	0	6
Concealed to bed of Gauley River	70	0

In southern Nicholas County and in Fayette, the Hughes Ferry Coal is generally soft and double-bedded, 1 to 2 inches of bony slate parting usually separating the seam in two unequal benches, the upper being about double the thickness of the lower, the whole attaining an average thickness of about 15 inches and seldom reaching 2 feet. These features are characteristic of the Iaeger bed in McDowell County, where a greater thickness of coal is found at this horizon and where it has been mined commercially for several years. For the latter reason, the name "**Iaeger**" is given greater prominence for this bed, following a practical rule of nomenclature for coal seams, when once a name has become attached to it under commercial conditions, it is very difficult to supplant it by another by reasons of priority or otherwise.

Its thickness and stratigraphic position are exhibited in the sections published in Chapter IV for Gauley Bridge—1 Mile Southeast and Carnifex Ferry in Falls District; Powellton and Kingston in Kanawha; Ansted in Mountain Cove; Divide in Nuttall; South Fayette Station in Fayetteville; Sims Schoolhouse in Sewell Mountain; in the logs of oil and gas test borings Nos. 12, 14, 15, 18, 20, and 21 on Map II, published in Chapter X; and in the logs of about 30 of the coal test borings published in Chapter XI. Its outcrop should follow about 200 feet below that outlined on Map II for the division line between the Kanawha and New River Groups.

In **Falls District** Teets obtained the following section at **Coal Exposure No. 237 on Map II**, at the edge of the public road on the north hillside of the Kanawha River, 1.35 miles southwest of the railway station at Kanawha Falls:

	Ft.	In.
Sandstone, **Upper and Lower Nuttall**, great cliff	150	0
Slate	0	4
Coal, Hughes Ferry, (Iaeger) (710′ B.)	0	11

Eight-tenths mile northeastward, on the same side of the Kanawha River and in the same highway, Teets reports the same bed at **Coal Exposure No. 238 on Map II,** with a thickness of one foot and at an elevation of 685′ B., directly below a sandstone cliff—Lower Nuttall—60 feet in height.

Just across the County Line from Falls District in the edge of Nicholas, the author measured 14 inches for this bed at **Coal Opening No. 239 on Map II,** just on the southwest side of the hill road and ¾ mile southeast of Carnifex Ferry, at an elevation of 1555′ B.

In **Kanawha District** the author measured the following section at **Coal Exposure No. 240 on Map II,** at the edge of the public road on the south bank of the Kanawha River, 2.4 miles southwest of the C. & O. Railroad station at Kanawha Falls:

	Feet.
Sandstone, **Upper Nuttall,** grayish-white, hard, current-bedded, "calamite" fossil plant stems................	40
Concealed in steep slope............................	35
Sandstone, **Lower Nuttall,** massive and current-bedded, grayish-white, conglomeratic, great cliff............	95
Concealed and shale, sandy...........................	4
Coal, soft, Hughes Ferry (Iaeger) (660′ B.)...........	1.2
Shale	0.5
Concealed to C. & O. Railroad grade.................	4.5

In the same District, the author collected a sample of coal for analysis and measured the following section at **Coal Exposure No. 99 on Map II,** in the edge of the public road along Falls Creek, 0.1 mile southeast of Kanawha Falls:

		Feet.	Inches.
1.	Sandstone, **Lower Nuttall,** grayish-white, pebbly, great cliff.............................	75	0
2.	Shale, bluish-gray, siliceous, no plant fossils seen	4	0
3.	**Coal,** bony.... 0′ 1″ } **Hughes Ferry** (725′ B.)...	1	1
4.	**Coal,** soft..... 1 0		
5.	Shale, dark, sandy, laminated, visible...........	40	0

The composition of the sample from No. 4 of the section, as reported by Messrs. Hite and Krak under Laboratory No. 917H, is published under **No. 99** in table No. 1 of coal analyses at the end of Chapter XI. The results show this bed to be quite pure and that it carries only 5 per cent. less fixed carbon than the Iaeger Coal does in McDowell County.

Three-fourths mile northeastward in the same District, the author measured the following section at **Coal Exposure No. 241 on Map II,** along the C. & O. Railroad grade on the south bank of New River, just above Old Gauley Station:

	Feet.	Inches.
Sandstone, **Lower Nuttall,** conglomerate, making great cliff	100	0
Shale, dark, plant fossils	4	0
Coal, Iaeger "A"?, bony, with several slate partings	3	0
Shale, sandy	5	0
Sandstone, grayish-white, massive	20	0
Coal, soft, Iaeger, Hughes Ferry (690′ B.)	0	10
Fire clay shale	..	..

The 3 feet of bony and slaty coal, 4 feet below the Lower Nuttall Sandstone, tentatively correlated with the **Iaeger "A,"** appears to be local in its occurrence, as shown by the following section measured by the author at **Coal Exposure No. 242 on Map II,** 150 to 200 yards southeastward along the same railway grade:

	Feet.
Sandstone, **Lower Nuttall,** making great cliff	100
Coal, soft, Iaeger, Hughes Ferry (715′ B.)	1
Shale and shaly sandstone	5
Sandstone, platy, laminated with thin shale layers to C. & O. Railroad grade	17

In the two foregoing exposures there is no question but that the bed correlated as the Hughes Ferry bed is the same in each instance, as it can be traced directly by outcrop from No. 241 to No. 242, so that the thick bony bed of the former, 25 feet higher in the measures, has disappeared entirely.

Just across the County Line in Nicholas from the northeast edge of **Nuttall District,** it is the Hughes Ferry bed that was once mined at **Coal Opening No. 243 on Map II,** on the north side of the hill road, 0.33 mile east of Shawver Bridge over Meadow River:

	Feet.
Sandstone, **Lower Nuttall,** grayish-white, conglomeratic, making great cliff	75
Concealed	20
Coal, Hughes Ferry (Iaeger), at closed opening (1700′ B.)	..

The author was unable to learn the thickness of the bed, but judging from its development in other portions of Nicholas and the adjoining region of Fayette, it is probably less than 18 inches.

In **Sewell Mountain District,** the following section was measured by the author at **Coal Exposure No. 244 on Map II,** at the north edge of the James River & Kanawha Turnpike, 3.3 miles southeast of Ravenseye:

	Ft.	In.
Sandstone, **Lower Nuttall,** current-bedded, to massive, grayish-white and brown, forming cliffs....	35	0
Coal, Hughes Ferry (Iaeger) (3120′ B.), visible.....	0	2

It is quite evident from the foregoing data on this coal seam that it is too thin and irregular to be classed as a minable bed.

The **Middle Iaeger Sandstone** of the author[9], belonging at its type locality—Iaeger, McDowell County—in the interval separating the coal bed last described from the underlying Lower Iaeger Coal, was not observed in Fayette.

THE LOWER IAEGER COAL.

The Lower Iaeger Coal of the author[10], belonging at its type locality—Iaeger, McDowell County—immediately below the sandstone last mentioned and 40 to 50 feet below the Iaeger Coal, is present in Fayette, but, as in the former County, it is too thin and irregular to be classed as minable. Its thickness and stratigraphic position are exhibited in the sections published in Chapter IV for South Fayette Station, Fayetteville—1.5 Miles Northwest, and Parral, pages 181, 183, and 186, respectively, and in the logs of coal test borings Nos. 28, 35, 38, 67, 68, and 85 on Map II, the details of which are published in Chapter XI.

The **Lower Iaeger Sandstone** of the author[11], belonging at its type locality near Iaeger, McDowell County, in the interval separating the coal bed last described from the underlying Harvey Conglomerate Sandstone, was not observed in Fayette.

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[9] Ray V. Hennen, Wyoming-McDowell Report, W. Va. Geol. Survey, p. 190; 1915.

[10] Loc. cit., p. 190.

[11] Loc. cit., p. 191.

THE LOWER IAEGER SHALE.

The Lower Iaeger Shale of the author[11a], belonging at its type locality—near Iaeger, McDowell County—as shown in the General Section of the Pottsville Series published in Chapter IV, page 107, in the interval separating the Lower Iaeger Sandstone from the underlying Harvey Conglomerate and ranging in thickness from 20 to 35 feet, was observed at only one exposure as shown in the following section measured southwestward mostly with aneroid by the author along the hill road 0.3 mile due east of Whipple:

		Thickness. Feet.	Total. Feet.
Shale, buff and sandy, **Upper Iaeger**		5	5
Coal, soft, columnar 0' 11" **Coal** and slate, interlaminated 0 2 **Coal**, slaty 0 5	**Hughes Ferry Iaeger** (1835'B.)	1.5	6.5
Shale		5	11.5
Sandstone, coarse, brown		25	36.5
Shale and fire clay		3	39.5
Coal, soft 0' 3" Fire clay shale 1 0 **Coal** 0 3	**Lower Iaeger**	1.5	41
Fire clay shale		5.5	46.5
Coal		0.3	46.8
Fire clay shale		4.7	51.5
Shale, Lower Iaeger, buff, brown, argillaceous		25	76.5
Concealed		20	96.5
Shale, black, laminated, to sandstone		15	111.5
Interval to **Sewell Coal,** estimated		390	501.5

THE HARVEY CONGLOMERATE SANDSTONE

The Harvey Conglomerate of Campbell[12], belonging in its type locality—Harvey (now Bolt P. O.), Raleigh County—50 to 100 feet below the Lower Nuttall Sandstone and ranging in thickness from 0 to 50 feet, is a very pronounced ledge in Fayette, especially along the valley walls of New River southeastward from Gauley Junction to Keeney Creek, where it frequently forms cliffs 50 to 75 feet in height about the same distance below the great Lower Nuttall Sandstone cliff. Its thickness and stratigraphic position are exhibited in the sections published in Chapter IV for Kingston in Kanawha District; Ansted in Mountain Cove; Divide, Winona, and Nuttallburg in Nuttall; South Fayette, Fayetteville—1.5 Miles Northwest, Parral, and Herberton in Fayetteville; Corliss and Rader Ford in Sewell Mountain; in the logs of oil and gas test wells Nos. 6A, 15, 18, 20-23 and 29 on Map II, published in Chapter X; and in the logs of 33 of the coal test borings published in Chapter XI. No quarries were observed on this ledge in Fayette, but in many of its cliff exposures along New River, it is only slightly less siliceous than the Lower Nuttall Sandstone. Hence it should crush into a fair aggregate for concrete construction.

[11a] Loc. cit., pp. 191-2.

[12] M. R. Campbell, Raleigh Folio, No. 77, U. S. Geol. Survey; 1902

The **Sandy Huff Shale** of the author[13], belonging at its type locality—mouth of Sandy Huff Branch of Tug Fork, McDowell County—in the interval separating the sandstone last described from the underlying Castle Coal, was not observed in Fayette.

THE CASTLE COAL.

The Castle Coal of the author[14], belonging at its type locality—Castle, Wyoming County—110 to 125 feet below the Iaeger bed, directly above the Guyandot Sandstone, and 150 to 175 feet above the Sewell ("Davy") Coal, is quite persistent in Fayette, but, as in the former County, it is usually thin, impure, and irregular, although, in one or two instances, attaining a thickness of about 2 feet of fair coal. Its thickness and stratigraphic position are exhibited in the sections published in Chapter IV for Gauley Bridge—1 Mile Southeast, Albion, and Carnifex Ferry in Falls District; Ansted in Mountain Cove; Shawver Bridge, Miller, and Winona in Nuttall; South Fayette Station, Parral, and Herberton in Fayetteville; Rader Ford in Sewell Mountain; and in the logs of coal test borings Nos. 16, 28, 36, 37, 42, 46, 53, 60, 62, 76, 85, and 93C on Map II, the details of which are published in Chapter XI. Its outcrop follows roughly 130 to 175 feet above that outlined on Map II for the Sewell Coal bed. Along the eastern border of the County, it appears to be this bed that has been prospected to some extent by natives for local domestic fuel. The following opening in it was examined by both Reger and the author, and a sample for analysis collected by the former during his field work in Nicholas County during 1917:

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[13] Ray V. Hennen, Wyoming-McDowell Report, W. Va. Geol. Survey, p. 193; 1915.

[14] Loc. cit., pp. 193-4.

Lewis et al. Coal Opening—No. 245 on Map II.

In Nicholas County, east hillside of Meadow River, 150 to 200 yards east of Shawver Bridge, elevation, 1640' B.; **Castle Coal**, reported 21 inches thick, clean and soft by D. B. Reger.

The composition of the sample collected at the above opening, as reported by Messrs. Hite and Krak under Laboratory No. 341R, is as follows:

	Per cent.
Moisture	7.36
Volatile Matter	35.46
Fixed Carbon	52 68
Ash	4.50
Total	100.00
Sulphur	0.52
Phosphorus	0.004

Slightly over 9 miles southeastward in Sewell Mountain District and 1 mile due west of Rader Ford, it appears to be the Castle Coal that was once mined for domestic fuel at the **J. W. Amick Coal Opening—246 on Map II,** at an elevation of 2845' B., as determined by the author. The opening had fallen shut, but, according to Mr. Amick, the coal is medium-hard and fairly free from partings, with a thickness ranging from 18 to 24 inches.

Less than one-half mile northeastward at **Coal Opening No. 247 on Map II,** this bed has practically the same thickness at an elevation of 2860' B., as shown in the Rader Ford Section, published in Chapter IV, page 202.

A careful study of all the data obtainable in regard to the Castle Coal in Fayette does not warrant its classification as a minable seam.

THE GUYANDOT SANDSTONE.

The Guyandot Sandstone of Campbell[15], belonging at its type locality—Laurel Fork of Guyandot River, 1 mile southwest of McGraw, Wyoming County—as more fully described by the author[16], directly below the coal bed last described and 60 to 75 feet above the Sewell seam and ranging in thickness from 50 to 100 feet, is quite persistent in Fayette, although not so prominent a cliff-maker as in the former County. It is more or less lenticular, massive to current-bedded, medium- to coarse-grained and pebbly, gray to grayish-white in color. Its thickness and stratigraphic position are exhibited in the sections published in Chapter IV for Gauley Bridge—1 Mile Southeast and Horseshoe Creek in Falls District; Kingston in Kanawha; Ansted in Mountain Cove; Shawver Bridge, Miller, Russellville, Divide, and Nuttallburg in Nuttall; Cotton Hill, South Fayette Station, Fayetteville—1.5 Miles Northwest, Parral, and Herberton in Fayetteville; Manns Creek, Ravenseye, Corliss, and Sims Schoolhouse in Sewell Mountain; in the logs of oil and gas test wells Nos. 6A, 9, 15, 18, 20, 21, 23, and 29 on Map II, published in Chapter X; and in the logs of 25 to 30 of the coal test borings published in Chapter XI. Along the New River gorge it is frequently observed as the lower of the two pronounced cliffs between the great Lower Nuttall Sandstone cliff and the Sewell Coal. As shown in the Gauley Bridge—1 Mile Southeast Section, page 128, the massive to current-bedded and conglomeratic sandstone in the bed of New River at Gauley Junction, is the Guyandot ledge. Southeastward from the latter point it forms great cliffs along the C. & O. Railroad grade to within one-half mile of Cotton Hill, the "Shoofly", "Blue Hole" and "Popenose" tunnels of the latter railroad being driven through this stratum. No quarries were observed on this ledge, but it should be adapted to practically the same uses as described for the East Lynn ledge, page 228.

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[15] M. R. Campbell, Raleigh Folio, No. 77, U. S. Geol. Survey, 1902.

[16] Ray V. Hennen, Wyoming-McDowell Report, W. Va. Geol. Survey, pp. 194-5; 1915.

THE SEWELL "B" COAL.

The Sewell "B" Coal of the author[16a], belonging at its type region—Wyoming and McDowell Counties—at 0 to 5 feet below the sandstone last described and 75 to 100 feet above the Sewell ("Davy") Coal, is quite persistent in Fayette, although being too thin and impure to warrant classification as a minable seam. Its thickness and stratigraphic position are exhibited in the special sections published in Chapter IV for Panther Mountain, Russellville, Nuttallburg, Fayetteville—1.5 Miles Northwest, Parral, Herberton, Corliss, Maywood—Aldrich Camp and Sims Schoolhouse; and in the logs of 15 to 20 of the coal test borings, the details of which are published in Chapter XI. Like the Castle bed the Sewell "B" has been prospected somewhat by natives for local domestic fuel along the eastern border of Fayette. In the eastern edge of Falls District at the **Mrs. A. P. Patterson Coal Opening—No. 248 on Map II,** 200 to 300 feet southwest of Carnifex Ferry at the mouth of Meadow River, this bed is reported 18 inches in thickness, at an elevation of 1240′ B., as determined by the author and as exhibited in the Carnifex Ferry Section, page 142.

Fifteen miles southeastward in Sewell Mountain District, it is the Sewell "B" Coal that crops at **Coal Exposure No. 249 on Map II,** in the turnpike, just east of the road fork, 3.4 miles N. 60° to 70° W. of Rainelle, at an elevation of 2965′ B., about 75 feet above the horizon of the Sewell bed. Here, it does not much exceed 1 foot in thickness.

One mile and a half southeastward in the same turnpike, the author measured the following section at **Coal Exposure No. 250 on Map II,** at watering trough, 100 to 200 yards west of the schoolhouse:

	Ft.	In.
Shale, buff, sandy, visible	3	0
Coal, slaty..... 0 3		
Sewell "B" (3140′ B.)	1	11
Coal, slaty..... 0 3		
Slate, gray	5	0

[16a] Loc. cit., pp. 195-6 and 535-541.

About 300 yards eastward in the same turnpike at **Coal Exposure No. 251 on Map II,** the Sewell "B" bed is 18 inches to 2 feet in thickness at an elevation of 3170′ B., its stratigraphic position here being shown in the Maywood—Aldrich Camp Section, published in Chapter IV, page 202.

THE SEWELL "A" COAL.

The Sewell "A" Coal of the author[17], belonging at its type region—Wyoming and McDowell Counties—20 to 30 feet below the bed last described and 30 to 50 feet above the Sewell Coal proper, was observed at several points in Fayette, where it is of even less economic importance than the Sewell "B" seam. Its thickness and stratigraphic position are exhibited in the sections published in Chapter IV for Panther Mountain and Herberton; and in the logs of coal test borings Nos. 28, 29, 30, 31, 34, 35, 37, 38, 58, 88, 93, 93B, and 93D on Map II, the details of which are published in Chapter XI.

THE LOWER GUYANDOT SANDSTONE.

The Lower Guyandot Sandstone of the author[18], belonging at its type locality—Wilmore, McDowell County—immediately below the coal last described and directly above the Sewell ("Davy") bed, is present in practically the same development in Fayette as in the former County. It is usually massive to current-bedded, medium-grained, ranging from micaceous to quartzitic, gray to grayish-white in color. Its thickness and stratigraphic position are exhibited in the sections published in Chapter IV for Kingston, Miller, Russellville, Winona and Nuttallburg; and in the logs of coal test borings Nos. 28, 29, 30, 34, 35, 37, 38, 58, and 88 on Map II, the details of which are published in Chapter XI.

According to Teets, this ledge furnished the stone for the construction of a battery of 100 beehive coke-ovens at Coal Mine No. 155 on Map II at Glen Jean; and the same is true for another battery of 100 beehive coke-ovens at Coal Mine

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[17] Loc. cit., p. 196.
[18] Loc. cit., pp. 175 and 196-7.

No. 167 on Map II, near Turkey Knob; in each instance the stone being quarried from an exposure of the ledge directly above the Sewell Coal near the mine.

THE HARTRIDGE BLACK SHALE.

The Hartridge Black Shale of Reger[19], belonging at its type locality—Hartridge, Randolph County—directly above the Sewell Coal and carrying a fossil fauna indicating either a marine or brackish-water deposition, is somewhat lenticular in Fayette but present in many localities, on the south hillside of New River at South Fayette Station carrying fossil shells of the genus **Lingula.** Its thickness and stratigraphic position are exhibited in the sections published in Chapter IV for Panther Mountain and South Fayette Station, pages 141 and 181, respectively; and in the logs of coal test borings Nos. 34, 42, 45, 46, 53, 65, 67, 68, 77, 81, 87, 89, and 90 on Map II, the details of which are published in Chapter XI.

THE SEWELL COAL.

The Sewell (Nuttall) Coal of White[20], belonging at its type locality—Sewell Mountain, Fayette County—directly below the shale last described and 60 to 80 feet above the Upper Raleigh Sandstone, attains a fine development in the territory of this Report where it has long been mined extensively on a commercial scale. It is always multiple-bedded, soft and columnar, in its minable area usually ranging in thickness from 30 to 60 inches. It has an enviable reputation as a steam, domestic, and coking coal, especially for the latter use when mixed with a high volatile and medium high ash coal. It is the same as the **"Davy"** bed of McDowell County, where it yields a fuel with the highest average calorific value —over 15,500 British Thermal Units per pound of coal—yet reported in the United States. In Fayette, as in the latter County, it is a very important "key-rock," the **red** structure contours on Map II, covering that area lying to the southeast of its 1300-foot level, being based on it. Its outcrop is outlined in detail on the same map. In Chapter III, page 89, a table of intervals is published showing its approximate distance in feet above and below other well-known members of the rock column at 18 scattered points in the county. Its thickness and stratigraphic position are exhibited in the sections published in Chapter IV for 25 scattered points; and in about 50 of the logs of the coal test borings, the details of which are published in Chapter XI.

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[19] D. B. Reger, Barbour-Upshur-W. Randolph Report, W. Va. Geol. Survey, pp. 288-290; 1918.

[20] I. C. White, The Virginias, pp. 7-16; January, 1885; Bull. 65, U. S. Geol. Survey, p. 197; 1891; and Vol. II, W. Va. Geol. Survey, pp. 657-665; 1903.

In addition to the commercial mines it has also been prospected extensively by the large land-holding companies. Its thickness and character at these diggings and the mines are described in the last-mentioned Chapter, along with Figure 20, showing its approximate minable area, and also an estimate of its available tonnage.

THE WELCH SANDSTONE.

The Welch Sandstone of the author[21], belonging at its type locality—Welch, McDowell County—in the 60 to 70 feet of interval separating the coal last described from the underlying Welch Coal, is more or less lenticular and irregular in its occurrence in Fayette. Its thickness and stratigraphic position are exhibited in the sections published in Chapter IV for Nuttallburg, South Fayette Station, and Maywood—Aldrich Camp; and in the logs of coal test borings Nos. 58, 66, 76, and 79A on Map II, the details of which are published in Chapter XI. According to Teets, the stone used in the construction of a battery of 124 beehive coke-ovens at the Macdonald Mine of the New River Coal & Coke Co.,—No. 168 on Map II—was obtained from a **sandstone quarry** in a ledge directly below the Sewell Coal in the immediate vicinity. The quarry rock evidently correlates with the Welch Sandstone, as the Upper Raleigh ledge belongs 60 to 75 feet below the coal bed last mentioned in this locality.

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[21] Ray V. Hennen, Wyoming-McDowell Report, W. Va. Geol. Survey, pp. 198-9; 1915.

THE WELCH COAL.

The Welch Coal of White[21a], belonging at its type locality —Welch, McDowell County—60 to 70 feet below the Sewell ("Davy") Coal, directly below the sandstone last described and 0 to 10 feet above the great Upper Raleigh Sandstone, is present in Fayette at an interval ranging from 35 to 90 feet below the Sewell Coal. It appears to represent a separate and distinct bed and not a "split" off the Sewell as tentatively suggested on page 244 of Volume II(A) of the State Survey Reports. Although mined extensively on a commercial scale in McDowell County, in Fayette it appears to be too thin, lenticular and irregular to be of any economic worth. Its thickness and stratigraphic position are exhibited in the sections published in Chapter IV for Ansted, South Fayette Station, and Maywood—Aldrich Camp, pages 170, 181, and 202, respectively; and in the logs of coal test borings Nos. 25, 46, and 88 on Map II, the details of which are published in Chapter XI.

This coal was observed at several outcrop exposures in Sewell Mountain District, in the northwestern edge of the latter, at **Coal Exposure No. 252 on Map II,** in the public highway just south of the cross-roads, 1¾ miles southeast of Winona, where it is 6 inches in thickness at an elevation of 2400′ B., 70 feet below the crop of the Sewell bed, as determined by the author.

Six miles southeastward at **Coal Exposure No. 253 on Map II,** in the public road, 0.4 mile south of Pittman, 7 to 8 inches of slaty coal crops at its horizon at an elevation of 2625′ B., 40 to 50 feet below the Sewell Coal. Four miles northeastward and 1.5 miles southeast of Ravenseye, at **Coal Exposure No. 254 on Map II,** the following section was measured by the author:

	Feet.	Inches.
Coal, Sewell (slate roof) (2645′ B.)	1	9
Slate and concealed	25	0
Sandstone, Welch, visible	5	0
Coal, Welch	0	6
Shales, sandy and hard, visible	2	0

[21a] I. C. White, Vol. II, W. Va. Geol. Survey, pp. 666-7; 1903.

In the same District (Sewell Mountain), 2½ miles southwestward and just north of the Pine Grove Schoolhouse, at **Coal Exposure No. 255 on Map II,** closed on date of author's visit, the Welch bed is reported only 8 inches in thickness. Its elevation here is 2630′ B., 35 to 40 feet below another prospect in the Sewell Coal.

Three-tenths mile southeastward at **Coal Exposure No. 256 on Map II,** the Welch Coal is only 6 inches in thickness, at an elevation of 2645′ L., 35 feet below the Sewell, and 5 feet above the top of the Upper Raleigh Sandstone.

At **Coal Exposure No. 257 on Map II,** 3½ miles eastward and ½ mile due south of the summit of Buster Knob, the Welch Coal is only 3 inches in thickness, at an elevation of 3095′ B., as determined by the author, 35 to 50 feet below the Sewell bed and 25 feet above the massive portion of the Upper Raleigh Sandstone.

At the **H. L. Gwinn Coal Prospect No. 258 on Map II,** at an elevation of 3135′ B., as determined by the author, the Welch Coal is only 6 to 8 inches in thickness, according to Ottaway Gwinn. It is self evident from the foregoing data that the Welch Coal is too thin to warrant classification as a minable bed, but the information given is of interest to the extent that it demonstrates that the Welch is a separate and distinct bed in the type locality of the Sewell Coal.

THE UPPER RALEIGH SANDSTONE.

The Upper Raleigh Sandstone of White[22], or the upper division of the Raleigh Sandstone of Campbell[23], occupying the major portion of the interval—90 to 110 feet—separating the bed last described from the underlying Little Raleigh Coal, is widely persistent in Fayette and a valuable "key-rock." Here it is generally heavy- to current-bedded, medium- to coarse-grained, micaceous to quartzitic, usually conglomeratic, grayish-white to grayish-brown in color, and forming great cliffs around the mountain sides along its outcrop. It has acted as a friendly mantle in conjunction with the underlying

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[22] I. C. White, Vol. II(A), W. Va. Geol. Survey, p. 198; 1908.

[23] M. R. Campbell, Raleigh Folio, No. 77, U. S. Geol. Survey; 1902.

Lower Raleigh ledge in preserving from erosion a large acreage of the coal beds of the New River Group. Its thickness and stratigraphic position are exhibited in the sections published in Chapter IV for Horseshoe Creek and Peters Creek in Falls District; Kingston in Kanawha; Ansted in Mountain Cove; Russellville, Winona and Nuttallburg in Nuttall; Cotton Hill and South Fayette Station in Fayetteville; Manns Creek, Sewell, Beury, Ravenseye, Corliss, Maywood—Aldrich Camp, Sims Schoolhouse, and Sievy Bridge Station in Sewell Mountain; Quinnimont—North Side, Meadow Creek Station and Walnut Flat Schoolhouse in Quinnimont; in the logs of oil and gas test borings Nos. 11, 12, 15, 18, 20, 21, 23 and 29 on Map II, published in Chapter X; and in the logs of 20 of the coal test borings published in Chapter XI. Its outcrop should follow 40 to 75 feet below that outlined on Map II for the Sewell Coal bed. Northwestward from Cotton Hill along the New River gorge to Gauley Junction, this ledge and the overlying Guyandot Sandstone appear to have coalesced, cutting away entirely the intervening shales and Sewell Coal. Southeastward along the same gorge from Cotton Hill to the Summers County Line it forms great cliffs, and the same is true for it along the valley walls of Meadow River above Miller P. O., and on Keeney, Arbucle, Dunloup, Buffalo, Slater, and Laurel Creeks. In the northern edge of the County it is this ledge, as shown in the Mouth of Peters Creek Section, page 138, that forms the "flat-rock" bottom for the bed of Gauley River at the mouth of Flat Rock Hollow, 0.8 mile eastward from the mouth of Beech Run. It is this ledge that is quarried for glass-sand near the crest of the east valley wall of New River, slightly less than one-half mile eastward from Ephraim, a description of which, along with an analysis of the sand, is published under "Glass-Sand" in Chapter XII.

If the Sewell Coal correlates with the Sharon bed, as indicated in the Rowlesburg (Preston County) Section published in Chapter VI, page 237, then the Upper Raleigh Sandstone undoubtedly correlates with the Sharon Sandstone of the Pottsville Series of western Pennsylvania and northern West Virginia.

THE LITTLE RALEIGH "A" COAL.

The Little Raleigh "A" Coal of Krebs[24], belonging in its type region—Raleigh County—immediately at the base of the sandstone last described and 10 to 25 feet above the Little Raleigh Coal proper, was observed in Fayette only at Beury, (See Beury Section, page 199), and it is recorded in the log of coal test boring No. 13A on Map II, just south of Page, the details of which are published in Chapter XI. Here, it is only 7 inches in thickness, 15 feet above the Little Raleigh bed. It has never been mined commercially in the State and is of no economic importance in this County.

THE LITTLE RALEIGH COAL.

The Little Raleigh Coal of White[25], belonging at its type locality—Raleigh (now Beckley), Raleigh County—near the base of the 15 to 30 feet of dark shales separating the sandstone last described from the underlying Lower Raleigh ledge, is quite persistent in Fayette, although being too thin to be classed as a minable seam. It is generally multiple-bedded, soft, and columnar, seldom exceeding 15 inches in thickness. Its bituminous roof shales, as shown in the Beury Section published in Chapter IV, page 199, sometimes carry fossil shells of the genus **Lingula,** in fact the latter forms can usually be found in any dark to black argillaceous shale or slate of the Pottsville Series of the southern half of the State, even if these often appear to possess only a local development.

The thickness and stratigraphic position of the Little Raleigh Coal are exhibited in the sections published in Chapter IV for Ansted, Russellville, South Fayette Station, Beury, Corliss—1 Mile North, Sievy Bridge, and Walnut Flat Schoolhouse, and in the logs of coal test borings Nos. 10, 13A, 15, 26, 41, 42, 45, 58, 76, 81, 88, 93, 119, 146, 149, and 151 on Map II, the details of which are published on subsequent pages in Chapter XI.

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[24] C. E. Krebs, Raleigh Co. Report, W. Va. Geol. Survey, pp. 322 and 361; 1916.

[25] I. C. White, Vol. II(A), W. Va. Geol. Survey, pp. 198-9; 1908.

In the northern edge of **Falls District,** the author measured the following section at **Coal Exposure No. 259 on Map II,** on the south bank of Gauley River, on the point immediately west of the mouth of Horseshoe Creek:

	Feet.
Coal, Sewell, at closed prospect **(No. 455 on Map II)** (870′ B.)	3
Concealed	25
Sandstone, **Upper Raleigh,** grayish-white, making great cliff	76
Slate, black	8.2
Coal, Little Raleigh (760′ B.) (Exposure No. 259 on Map II)	0.8
Fire clay shale, sandy	3
Concealed to Gauley River	22

In the southwestern edge of **Mountain Cove District** it appears to be this bed at **Coal Exposure No. 260 on Map II,** that was found in the excavation for the C. & O. Railroad bridge piers at Hawks Nest, as exhibited in the Ansted—Hawks Nest Section published in Chapter IV, pages 170-2.

In **Nuttall District** only 4 inches of the Little Raleigh Coal is visible at **Coal Exposure No. 261 on Map II,** in the Keeney Creek Branch of the C. & O. Railroad, 0.5 mile west of Boone, at an elevation of 1565′ B., 4 feet below the great Upper Raleigh Sandstone cliff and about 160 feet below the Sewell Coal, as determined by the author.

In **Fayetteville District** it is only 6 inches in thickness at **Coal Exposure No. 262 on Map II,** in the edge of the public road along Arbuckle Creek, about one-half mile east of Minden and 0.2 mile east of the mouth of Rocklick Creek, at an elevation of 1555′ B., 15 feet below a cliff of the Upper Raleigh Sandstone.

In **Sewell Mountain District,** it is the Little Raleigh bed that was once opened at **Coal Prospect No. 263 on Map II,** on the north side of the public road along Glade Creek, 2.1 miles northeast of Danese, at an elevation of 2645′ B., 165 feet below the horizon of the Sewell bed, as determined by the author. The digging was closed when visited in 1916, but from the evidence on the dump it is probably not present in merchantable thickness and purity.

THE LOWER RALEIGH SANDSTONE.

The Lower Raleigh Sandstone of White[26], or the lower division of the Raleigh Sandstone of Campbell[27], attains in Fayette a development almost equal to that of the Upper Raleigh ledge, which it resembles in both texture and physical appearance. It usually occupies most of the interval between the bed last described and the underlying Beckley Coal. Its thickness and stratigraphic position are exhibited in the sections published in Chapter IV for Kingston, Russellville, Nuttallburg, South Fayette Station, Sewell—0.9 Mile South, Beury, Sims Schoolhouse, Sievy Bridge, Grandview—Royal, Boggs Knob—Sims Station; in the logs of oil and gas test borings Nos. 9, 12, 18, and 23 on Map II, published in Chapter X; and in about 20 of the logs of coal test borings published in Chapter XI. No quarries were observed on this ledge but it should crush into a clean, sharp sand suitable for concrete aggregate.

THE BECKLEY COAL.

The Beckley Coal of Campbell[28], and as later recognized by White[29], belonging at its type locality—Beckley, Raleigh County—immediately at the base of the sandstone last described and 225 to 250 feet below the Sewell Coal, does not appear to attain minable dimensions and regularity, although apparently thickening up locally immediately north and west of Parral, as shown in the logs of coal test borings Nos. 36 and 37 on Map II, details of which are published in this Report. Its thickness and stratigraphic position are exhibited in the sections published in Chapter IV for Nuttallburg, Sewell—0.9 Mile South, Corliss—1 Mile North, Grandview—Royal, and Boggs Knob—Sims Station; and in the logs of coal test borings Nos. 14, 35-37, 42, 46, 53, 79A, 81, 88, 111, 119, 120, and 146-150 on Map II, details of which are published in Chapter XI.

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[26] Loc. cit., pp. 198-9.

[27] M. R. Campbell, Raleigh Folio, No. 77, U. S. Geol. Survey; 1902.

[28] Loc. cit.

[29] I. C. White, W. Va. Geol. Survey, Vol. II, pp. 667-8; 1903; and Vol. II(A), pp. 186-195; 1908.

THE QUINNIMONT SANDSTONE.

The Quinnimont Sandstone of White[30], belonging at its type locality--Quinnimont, Fayette County—immediately below the coal bed last described, is more or less lenticular. Its thickness and stratigraphic position are exhibited in the Mouth of Manns Creek and Royal Sections, pages 196 and 208, respectively; and in the logs of coal test borings Nos. 14, 35, 46, 66, 81, 111, and 120 on Map II, the details of which are published in Chapter XI. No quarries were observed on it.

THE QUINNIMONT SHALE.

The Quinnimont Shale of Campbell[31], occupying together with the lenticular sandstone last described the interval separating the Beckley Coal from the underlying Fire Creek (Quinnimont) Coal and ranging in thickness at its type locality—Quinnimont, Fayette County—from 60 to 125 feet, is quite persistent throughout the region of its outcrop in the latter County. It is usually laminated, carrying both argillaceous and arenaceous layers, dark-gray to black in color, and subject to extreme variations in thickness. In fact, southwestward in the region extending from Eccles, Raleigh County, to Maben, Wyoming County, this great mass of shale, including the associated Quinnimont Sandstone, thins down at several points to only a few inches of coaly slate, permitting the junction of the Beckley and Fire Creek Coals with a total mining section of 5 to 8 feet, as described more fully by the author on pages 208-210 of the Wyoming-McDowell Report of the State Geological Survey. The thickness and stratigraphic position of this shale are exhibited in the sections published in Chapter IV for Mouth of Manns Creek and Royal, pages 196 and 208, respectively; and in the logs of coal test borings Nos. 41, 42, 45, 46, 111, 118, 120, and 149 on Map II, the details of which are published in Chapter XI.

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[30] I. C. White, Vol. II(A), W. Va. Geol. Survey, p. 13; 1908.

[31] M. R. Campbell, Raleigh Folio, No. 77, U. S. Geol. Survey; 1902.

THE FIRE CREEK ("QUINNIMONT") COAL.

The Fire Creek ("Quinnimont") Coal of White[32], belonging at its type localities in Fayette County 90 to 150 feet below the Beckley bed and 325 to 385 feet below the Sewell seam at Fire Creek and Quinnimont, respectively, is a valuable deposit of fuel in the latter County, where it has long been mined extensively on a commercial scale. It is usually multiple-bedded, soft, and columnar, typical of the coals of the New River and Pocahontas Groups, and it has a reputation almost equal to that of the Sewell bed as high-grade steam and coking coal. According to the reference last cited, it was first opened commercially at Quinnimont in the southern edge of the County—Mine No. 208 on Map II being one of the operations—by the Quinnimont Coal Company, from which place it was known locally as the **"Quinnimont Coal."** The limited supply of coal available at this operation, owing to the crop of the bed high up near the mountain summit, soon caused the abandonment of the mining plant. Seven to eight miles northward in the western edge of Sewell Mountain District, a bed of coal was opened somewhat later on Fire Creek—Mine No. 194 on Map II—from which stream it was designated the **Fire Creek Coal.** Later it was discovered that the Quinnimont and Fire Creek represented one and the same bed, but the trade name **"Fire Creek Coal"** had become so firmly established as to supplant the former in spite of the rules of geologic nomenclature favoring the former designation. As mentioned under the shale last described, southwestward in Raleigh and Wyoming Counties, the latter stratum and its associated Quinnimont Sandstone frequently thin down to a few inches of coaly slate, permitting the junction of the overlying Beckley and this bed into a single mining section of 5 to 8 feet.

The thickness and stratigraphic position of the Fire Creek Coal are exhibited in the sections published in Chapter IV for 14 scattered points; and in a number of the logs of the coal test borings, the details of which are published in Chapter

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[32] I. C. White, Bull. 65, U. S. Geol. Survey, p. 197; 1891; and Vol. II(A), W. Va. Geol. Survey, pp. 179-185; 1908.

XI. Its outcrop is shown in detail on Map II. Its thickness and character at the commercial mines, country banks, and crop exposures, and its approximate minable area, as limited on Figure 21, are described in the same Chapter, along with an estimate of its available tonnage.

THE LITTLE FIRE CREEK COAL.

The Little Fire Creek Coal of White[33], belonging at its type locality—Grandview, Raleigh County—20 to 40 feet below the bed last described and having a thickness of less than one foot, is fairly persistent in the immediately adjoining area of the territory of this Report. Here, it is usually soft and columnar but hardly attains sufficient thickness and regularity to warrant its classification as a minable bed, although thickening up locally at a point or two into a seam that may sometime be operated, as the thicker and more regular coals approach exhaustion. Its thickness and stratigraphic position are exhibited in the sections published in Chapter IV for Kingston, Russellville, Mouth of Manns Creek, Corliss—1 Mile North, Sims Schoolhouse, Royal, Grandview — Royal, and Boggs Knob—Sims Station; and in the logs of coal test borings Nos. 15, 26, 45, 46, 79A, 111, 146, 150, and 151 on Map II, details of which are published in Chapter XI.

The author collected a sample for analysis and measured the succession shown in the Boggs Knob—Sims Station Section published in Chapter IV, page 218, at the **William Sims Coal Opening—No. 221 on Map II,** ¼ mile west of the summit of Boggs Knob, at an elevation of 3260′ B. The coal at this digging appears to represent the Little Fire Creek bed. The composition of the sample from the 23 inches included in the bottom bench, as reported by Messrs. Hite and Krak under Laboratory No. 925H, is published in the first table of coal analyses at the end of Chapter XI, under **No. 221.** The results indicate a coal of exceptional purity and calorific value.

One mile and a half northeastward in Greenbrier County, it appears to be this same bed that is opened at **W. H. Sims Coal Prospect No. 264 on Map II,** on the east side of Sims

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[33] I. C. White, Vol. II(A), W. Va. Geol. Survey, pp. 22 and 25; 1908.

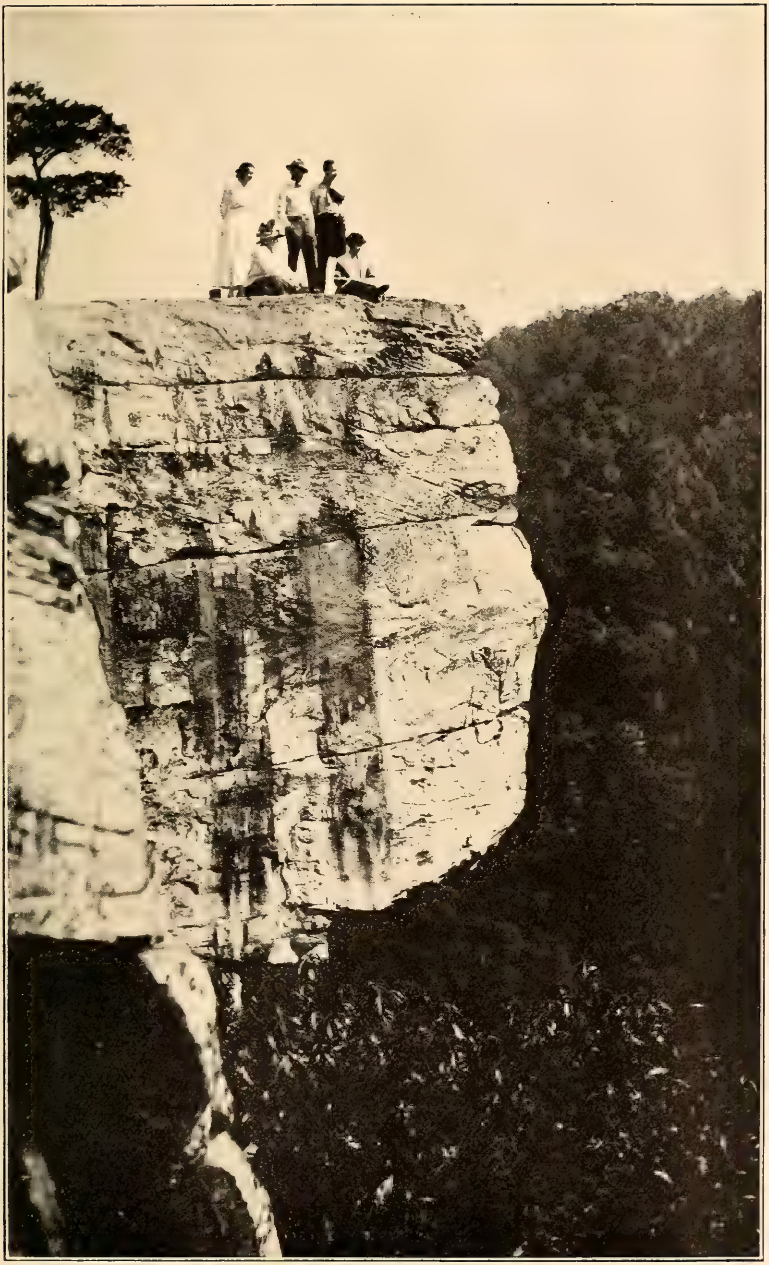

PLATE XI.—View of "Lover's Leap Rock" on north hillside of New River, just below Hawks Nest, formed from cliff exposure cf upper portion of Lower Nuttall Sandstone, exhibiting current-bedding in latter.

Mountain and the public road, 400 to 500 feet due south of the Sims Schoolhouse and 2 miles due south of Rainelle at an elevation of 3035′ B., the following section being measured here by the author:

			Feet.
Coal, bony and slaty	1′ 0″	Little Fire Creek	2.5
Coal, soft, columnar, (3035′ B.)	1 6		

The above opening belongs 125 to 140 feet above another in the No. 6 Pocahontas Coal and slightly over 400 feet below the horizon of the Sewell bed.

THE PINEVILLE SANDSTONE.

The Pineville Sandstone of the author[34], occupying at its type locality—Pineville, Wyoming County—most of the 100-foot interval separating the Fire Creek Coal from the underlying No. 9 Pocahontas Coal, is widely persistent in Fayette and is a pronounced cliff-former along the valley walls of Meadow River from the mouth of Burdette Creek southeastward to Rainelle and throughout the southern border and eastern portion of Quinnimont District. It is this great ledge that plays no small part in the preservation of the plateau southeastward from Backus to the Summers County Line, 1 mile northwest of Meadow Creek Station. Here, it belongs 15 to 25 feet below the Fire Creek Coal and directly below the Little Fire Creek bed. It is usually heavy- to current-bedded, medium-grained, micaceous to quartzitic, gray to grayish-white in color, ranging in thickness from 40 to 75 feet. Its stratigraphic position is exhibited in the sections published in Chapter IV for Powellton in Kanawha District; Russellville in Nuttall; South Fayette Station in Fayetteville; Manns Creek, Beury, Corliss, Rader Ford, Maywood—Aldrich Camp, and Sims Schoolhouse in Sewell Mountain; Alaska, Royal, Quinnimont—North Side, Lawton, Meadow Creek, Beury-town, Walnut Flat School, Boggs Knob—Sims Station, and Turniphole Mountain in Quinnimont; and in the logs of coal test borings Nos. 50, 79A, 111, 150, and 151 on Map II, the details of which are published in Chapter XI.

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[34] Ray V. Hennen, Wyoming-McDowell Report, W. Va. Geol. Survey, pp. 211-12; 1915.

The author collected a sample of this ledge for analysis at its great cliff exposures low down near the bed of Meadow River at the mouth of Burdette Creek in the edge of Greenbrier County. Here, it is exposed in a cliff 25 to 40 feet high, at an elevation of 2290′ B., 30 to 40 feet above the bed of Meadow River. The stone is grayish-white in color, medium-grained, and quartzitic, an inexhaustible supply of the stone being easily accessible from the long lines of cliff exposures southeastward along both valley walls of Meadow River. The composition of the sample, as reported by Messrs. Hite and Krak under Laboratory No. 916H, is published under "Glass-Sand" in Chapter XII. The results of this test indicate a sandstone carrying a very high percentage of silica, and a correspondingly low percentage of the impurities: ferric iron, alumina, lime, and magnesium.

The **No. 9 Pocahontas** and the **No. 8 Pocahontas Coal** beds of White[78] and as more definitely described by the author[79], belonging in their type regions of McDowell and Mercer Counties in the 75 to 100 feet of measures separating the sandstone last described from the underlying Flattop Mountain Sandstone or top member of the Pocahontas Group, were not definitely observed in the territory of this Report.

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[78] I. C. White, Vol. II(A), W. Va. Geol. Survey, pp. 102 and 177; 1908.

[79] Ray V. Hennen, Wyoming-McDowell Report, W. Va. Geol. Survey, pp. 212-13 and 213-14; 1915.

CHAPTER VIII.

STRATIGRAPHY—THE POCAHONTAS GROUP OF THE POTTSVILLE SERIES.

GENERAL ACCOUNT.

The Pocahontas Group or Lower Pottsville of White[1], beginning at top with the Flattop Mountain Sandstone and extending down through the rock column to the top of the Mauch Chunk red shales of the Mississippian, attains a maximum thickness for Fayette County of 400 to 425 feet in the southwestern edge of Quinnimont District, as against 700 to 750 feet for the same group in southeastern McDowell County where the maximum development for the State is represented. In Fayette the division plane between the New River and the Pocahontas Groups is not so sharply defined as in the Tug Fork of Big Sandy River region, owing to the absence of Nos. 9 and 8 Pocahontas Coal beds, and the tendency of the Pineville Sandstone or basal member of the New River Group of Fayette to coalesce with the underlying Flattop Sandstone mentioned above. Its strata consist of massive to current-bedded sandstones, medium- to coarse-grained, slightly argillaceous, comparatively free of pebbles, and light-gray to gray in color; shales, both argillaceous and arenaceous, buff, gray, and black in color, one—the Royal—carrying a fossil fauna closely approaching a marine phase; impure fire clays; and coal beds, generally multiple-bedded, soft, and columnar, types characteristic of the coal beds of the New River and Pocahontas Groups. Its coal beds have the greatest economic importance, two of which—the No. 6 Pocahontas and the No. 3

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[1] I. C. White, Vol. II(A), W. Va. Geol. Survey, p. 13; 1908.

Pocahontas—attain minable dimensions, purity, and regularity. The areal extent of the surface rocks of this group is shown in detail on Map II. Only two of its contained coal beds attain minable dimensions and regularity; viz, the No. 6 Pocahontas and the No. 3 Pocahontas, of which the former is by far the more important from an economic standpoint.

The sandstones, which constitute more than half its rock strata, affect the topography along their outcrops in a less striking manner than those of the New River Group, in that long lines of cliff exposures are not quite so common. The character and stratigraphic position of the several members of the Pocahontas Group are exhibited in the General Section of the Pottsville Series of the southern half of the State published in Chapter IV, pages 109-111, along with those of the Kanawha and New River Groups. In the same Chapter there are also published many special sections at widely scattered points that give similar data.

DESCRIPTION OF MEMBERS, POCAHONTAS GROUP.

A detailed description of the members of the Pocahontas Group will now be given in the descending order of their occurrence in the General Section of the Pottsville Series last mentioned.

THE FLATTOP MOUNTAIN SANDSTONE.

The Flattop Mountain Sandstone of White[2] and as more fully described by the author[3], belonging at its type locality—summit of Flattop Mountain, 2 miles northwest of Pocahontas, Virginia—300 feet above the No. 3 Pocahontas Coal, 5 to 15 feet above the No. 7 Pocahontas bed, and being the topmost member of the Pocahontas Group or of the Lower Pottsville, outcrops along the valley walls of New and Meadow Rivers above Thurmond and Rader Ford, respectively. As mentioned in Chapter VII under the description of the Pineville

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[2] Loc. cit., p. 13-14.

[3] Ray V. Hennen, Wyoming-McDowell Report, W. Va. Geol. Survey, pp. 216-17; 1915.

Sandstone, it is often so coalesced with the latter that it is difficult to determine where the one leaves off and the other begins. Its thickness and stratigraphic position are exhibited in the sections published in Chapter IV for Russellville, Manns Creek, and Beury, pages 176, 196, and 199, respectively. No quarries were observed on it.

The **Rift Shale** of the author[4], belonging immediately at the base of the sandstone last described, directly above the No. 7 Pocahontas Coal and ranging in thickness from 15 to 30 feet at its type locality—Rift, McDowell County—was not observed in Fayette.

THE NO. 7 POCAHONTAS COAL.

The No. 7 Pocahontas Coal of White[5] and as more fully described by the author[6], belonging at its type locality—Pocahontas, Virginia—immediately below the formation last described, 80 to 100 feet above the No. 6 Pocahontas Coal and 275 to 290 feet above the No. 3 Pocahontas bed, is very irregular in its occurrence in Fayette, and of doubtful economic worth, in fact its correlation is more or less uncertain in this County. It has been tentatively identified in the sections published in Chapter IV for Russellville, Beury and Walnut Flat Schoolhouse, pages 176, 199, and 217, respectively; and in logs of coal test borings Nos. 26, 143, and 148 on Map II, details of which are published in Chapter XI.

THE PIERPONT SANDSTONE.

The Pierpont Sandstone of the author[7], belonging at its type locality—Pierpont, Wyoming County—directly below the coal last described and 5 to 15 feet above the No. 6 Pocahontas bed, appears to be present in Fayette but its correlation is as uncertain as that of the member last described. It has been tentatively identified in the sections published in

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[4] Loc. cit., p. 217.

[5] I. C. White, Vol. II(A), W. Va. Geol. Survey, pp. 102-4; 1908.

[6] Ray V. Hennen, Wyoming-McDowell Report, W. Va. Geol. Survey, pp. 217-18; 1915.

[7] Loc. cit., p. 218-19.

Chapter IV for Russellville and Grandview—Royal, pages 176 and 209, respectively; and in the log of coal test boring No. 150 on Map II, details of which are published in Chapter XI. No quarries were observed on it.

THE ROYAL SHALE.

The Royal Shale of Krebs[8], constituting at its type locality—Royal, Raleigh County—the fossil-shell-bearing roof shales of the No. 6 Pocahontas Coal, appears to be fairly persistent in Fayette in practically the same development, being dark to black in color, somewhat argillaceous, and carrying fossil shells, the genus **Lingula** predominating. Its thickness and stratigraphic position are exhibited in the sections published in Chapter IV for Russellville, South Fayette Station, Mouth of Manns Creek, Beury, Royal, and Turniphole Mountain—½ Mile Northwest. Its presence in the measures of both Sewell Mountain and Quinnimont Districts further corroborates the author's correlation of the thick merchantable coal bed in this region, 150 to 170 feet below the Fire Creek seam, with the No. 6 Pocahontas Coal of Raleigh, Mercer, and McDowell Counties.

The author measured the following section at the crop of this shale in the roof of **Coal Prospect No. 585 on Map II** on the land of the New River & Pocahontas Consolidated Coal Co. in Quinnimont District on the waters of Lefthand Creek of Meadow Creek, 0.4 mile northeast of the summit of Beelick Knob:

			Feet.
Shale, Royal, black, argillaceous, with Lingula fossil shells			6
Coal, soft, 6″ to	0′ 7″	No. 6 Pocahontas (2778′ L.)	4.1
Bone, hard, 3″ to	0 4		
Coal, soft	3 2		
Slate, black, hard, pavement			..

This shale has about the same thickness in the roof of the No. 6 Pocahontas Coal and carries the same type of fossil shells at an exposure in the public road in the southeastern point of Quinnimont District, as exhibited in the Turniphole Mountain—½ Mile Northwest Section published in Chapter IV, page 219.

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[8] C. E. Krebs, Raleigh Co. Report, W. Va. Geol. Survey, pp. 366-7; 1916.

THE NO. 6 POCAHONTAS COAL.

The No. 6 Pocahontas Coal of White[9], described more fully by the author on page 220 of the Wyoming-McDowell Report of the State Survey and belonging at its type locality—Pocahontas, Virginia—80 feet below the No. 7 Pocahontas Coal and 189 feet above the No. 3 Pocahontas seam, attains minable dimensions and regularity in Sewell Mountain and Quinnimont Districts, where it is usually multiple-bedded, soft, and columnar, in its minable area ranging in thickness from 18 inches to 6 feet. It is this bed that is mined commercially near the Fayette-Greenbrier County Line on the southwest hillside of Meadow River, 1 mile northward from Rainelle at Coal Mine No. 222 on Map II, details concerning which are published in Chapter XI. Its thickness and stratigraphic position are exhibited in the sections published in Chapter IV for Russellville, Manns Creek, Sewell—0.9 Mile South, Beury, Maywood—Aldrich Camp, Sims Schoolhouse, Sievy Bridge, Royal, Lawton, Meadow Creek, Beurytown, Walnut Flat Schoolhouse, Boggs Knob, Turniphole Mountain—½ Mile Northwest, and Turniphole Mountain; and in the logs of coal test borings Nos. 26, 79A, 81, 143, 145, and 147 on Map II, details of which are published in Chapter XI. Its depth is also indicated in an additional number of these borings listed in a table of the same published in the last-mentioned Chapter. Its outcrop is outlined in detail on Map II. It has been prospected extensively in the southeastern portions of both Sewell Mountain and Quinnimont Districts by the New River & Pocahontas Consolidated Coal Co. Its thickness and character at these diggings, with Figure 22 showing its approximate minable area, are described in Chapter XI, and an estimate given for its available tonnage.

The **Eckman Sandstone** of the author[10], occupying at its type locality—Eckman, McDowell County—the major portion of the 75 to 90 feet of interval separating the coal last described from the underlying No. 4 Pocahontas bed, was not observed. The same is also true for the **No. 5 Pocahontas Coal** of White[11], belonging at its type region in McDowell County 25 to 30 feet above the underlying No. 4 Pocahontas Coal and described by the author[12] as probably a "split" off the latter seam.

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[9] I. C. White, Vol. II(A), W. Va. Geol. Survey, pp. 103-4; 1908.

[10] Ray V. Hennen, Wyoming-McDowell Report, W. Va. Geol. Survey, pp. 221-2; 1915.

THE NO. 4 POCAHONTAS COAL

The No. 4 Pocahontas Coal of Lathrop and White[13], belonging at its type locality—Pocahontas, Virginia—91 feet below the No. 6 Pocahontas bed and 96 feet above the No. 3 Pocahontas seam, is present in Fayette but does not attain sufficient thickness and regularity to warrant its classification as a minable coal. Its thickness and stratigraphic position are exhibited in the sections published in Chapter IV for Grandview—Royal, Beurytown, and Turniphole Mountain—½ Mile Northwest, pages 209, 215, and 219, respectively.

THE UPPER POCAHONTAS SANDSTONE.

The Upper Pocahontas Sandstone of the author[14], belonging at its type locality—Pocahontas, Virginia—0 to 5 feet below the coal last described and 0 to 10 feet above the underlying No. 3 Pocahontas Coal, is present in Fayette, as exhibited in the sections published in Chapter IV for Quinnimont—North Side, and Turniphole Mountain—½ Mile Northwest, pages 211 and 219, respectively; and in the log of coal test boring No. 150 on Map II, published with the Grandview—Royal Section, page 209.

The **No. 3 Pocahontas "Rider" Coal** of the author[15], belonging at its type region in southeastern Wyoming and McDowell Counties in the 10 to 20 feet of measures that sometimes separate the sandstone last described from the underlying No. 3 Pocahontas Coal, was not observed in Fayette.

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[11] I. C. White, Vol. II(A), W. Va. Geol. Survey, p. 104; 1908.

[12] Ray V. Hennen, Wyoming-McDowell Report, W. Va. Geol. Survey, p. 223; 1915.

[13] W. A. Lathrop, "The Virginias" for June, 1884, p. 97; I. C. White, Vol. II(A), W. Va. Geol. Survey, pp. 103-4; 1908.

[14] Ray V. Hennen, Wyoming-McDowell Report, W. Va. Geol. Survey, pp 224-5; 1915.

[15] Loc. cit., p. 226.

THE NO. 3 POCAHONTAS COAL.

The No. 3 Pocahontas Coal of Hotchkiss, Lathrop[16] and White, belonging at its type locality—Pocahontas, Virginia—185 feet below the No. 6 Pocahontas bed, 96 feet below the No. 4 Pocahontas seam, and directly below the Upper Pocahontas Sandstone, appears to attain minable dimensions in the southeastern border of Fayette in Quinnimont District. In this region it is usually multiple-bedded, soft, and columnar and more or less irregular in its occurrence, seldom attaining 3 feet in thickness. Its stratigraphic position is exhibited in the sections published in Chapter IV for South Fayette Station, Sievy Bridge, Grandview—Royal, Quinnimont—North Side, Beurytown, Boggs Knob—Sims Station, and Turniphole Mountain—½ Mile Northwest; and in the logs of coal test borings Nos. 27 and 150 on Map II, details of which are published in Chapter XI. Its outcrop is outlined in detail on Map II. It has not been mined commercially in Fayette but it has been prospected to some extent. Its thickness and character at these diggings are published in the last-mentioned Chapter, along with Figure 23 showing its approximate minable area, as also an estimate of its available tonnage.

The **Lower Pocahontas Sandstone** of the author[17], usually occupying in Mercer and southeastern Wyoming and McDowell Counties the major portion of the 40 to 60 feet of interval separating the coal last described from the underlying No. 2 Pocahontas bed, is present in Fayette in a more or less irregular and lenticular form. Its position in the measures is exhibited in the General Section of the Pottsville Series and that for Quinnimont—North Side, published in Chapter IV, pages 110 and 211, respectively.

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[16] W. A. Lathrop, "The Virginias" for June, 1884, p. 97; and I. C. White, Bull. 65, U. S. Geol. Survey, pp. 203-4; 1891; Vol. II, pp. 689-690; 1903; and Vol. II(A), pp. 103-4; 1908; W. Va. Geol. Survey.

[17] Ray V. Hennen, Wyoming-McDowell Report, W. Va. Geol. Survey, pp. 228-230; 1915.

The **No. 2 "A" Pocahontas Coal** of the author[18], belonging in its type region in southeastern Wyoming County 20 to 30 feet above the No. 2 Pocahontas Coal, was not observed in Fayette.

THE NO. 2 POCAHONTAS COAL.

The No. 2 Pocahontas Coal of Lathrop[19] and White, belonging at its type locality—Pocahontas, Virginia—67 feet below the No. 3 Pocahontas bed and 28 feet above the No. 1 Pocahontas seam, appears to be represented in Fayette, but it is thin and unimportant from a commercial standpoint. Its thickness and stratigraphic position are exhibited in the sections published in Chapter IV for Beurytown, and Turniphole Mountain—½ Mile Northwest, pages 215 and 219, respectively.

The **No. 1 Pocahontas Coal** of Lathrop[20] and White, belonging at its type locality—Pocahontas, Virginia—90 to 100 feet below the No. 3 Pocahontas bed and 25 to 30 feet below the No. 2 Pocahontas seam, appears to be also represented in Fayette, but is too thin and impure to have any economic worth. Its thickness and position in the measures are indicated in the Quinnimont—North Side Section, published in Chapter IV, page 211.

THE NORTH FORK SHALE.

The fossil-shell-bearing North Fork Shale of the author[21], belonging 60 to 70 feet below the bed last described and forming the roof shales of the Simmons Coal of the author[22], in their type localities in McDowell and Mercer Counties, appears to be represented in Fayette by a similar fossil-shell zone at 50 to 75 feet above the base of the Pottsville Series. In the western portion of Sewell Mountain District, the author obtained the following data at what appears to be an exposure of this member on the south hillside of Manns Creek along the Manns Creek Railroad grade, near the point where the latter is intersected by the axis of the Mann Mountain Anticline as the latter is outlined on Map II:

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[18] Loc. cit., p. 230.

[19] W. A. Lathrop, "The Virginias" for June, 1884, p. 97; and I. C. White, W. Va. Geol. Survey, Vol. II, pp. 689-690; 1903; and Vol. II(A), pp. 103-4; 1908.

[20] Loc. cit.

[21] Ray V. Hennen, Wyoming-McDowell Report, W. Va. Geol Survey p. 239; 1915.

[22] Loc. cit., pp. 239-240.

	Feet.	Inches.
Shale, North Fork, black, with many small pelecypod fossil shells	15	0
Limestone, hard, greenish-gray (1905′ B.)	0	8
Shale, dark, to railroad grade	2	0

The above exposure belongs about 720 feet below the horizon of the Sewell Coal. Slightly less than ¾ mile northwestward along the same railroad grade, the author measured the following section at the crop of the same member at a structural level 130 feet lower:

			Feet.	Inches.
Sandstone, making cliff			40	0
Concealed			10	0
Shale, black	18′ 0″	**North Fork Shale** (1775′ B.)	23	1
Sandstone, limy, dark, crinoid fossils abundant	0 4			
Shale, black	4 0			
Limestone, fairly pure, marine fossils	0 9			
Shales, black, to railroad grade			4	0

CHAPTER IX.

STRATIGRAPHY---THE MAUCH CHUNK SERIES.

GENERAL DESCRIPTION.

The Mauch Chunk Series or the upper division of the Mississippian crops to the surface in Fayette in Sewell Mountain and Quinnimont Districts, and along the west hillside of New River in the southeast edge of Fayetteville District and includes the beds extending down through the rock column from the base of the Pottsville to the top of the great Greenbrier Limestone. Its strata are largely made up, with one or two exceptions, of thinly bedded, green to reddish-brown, medium-grained, micaceous sandstones, alternating irregularly with red and green shales, the whole ranging in thickness from 400 to 500 feet in the northwestern border of the County to probably 2500 feet in the southeastern margin in the Meadow Creek region. At the latter station on the C. & O. Railroad, 1200 to 1300 feet of these measures crop above the bed of New River, with probably almost as great a thickness lying below the same stream. A general section of the Mauch Chunk Series for this area in the region of its maximum development is published at the beginning of Chapter IV, page 113. In the same Chapter the thickness and character of its beds are exhibited in the special sections for Alaska, Belva--0.7 Mile South, Beurytown, Boggs Knob—Sims Station, Grandview — Royal, Kingston, Lawton, Manns Creek, Marting, Meadow Creek Station, Powellton, Quinnimont—North Side, Quinnimont—South Side, Royal, Sewell—0.9 Mile South, Sievy Bridge, Turniphole Mountain, and Terry. The areal extent of its surface rocks is shown in detail on Map II. Although these rocks lie below drainage in the northwestern two-thirds of the

County, yet a knowledge of their character has been obtained in this region from the logs of oil and gas test borings, some of which are published in connection with the sections last given, and others in Chapter X. In the general section of the series, mentioned above, the Princeton Conglomerate and the Terry Limestone are the only members in Fayette that appear to attain sufficient importance to warrant designation. These will now be described.

THE PRINCETON CONGLOMERATE SANDSTONE.

The Princeton Conglomerate Sandstone of Campbell[1], belonging in the Mauch Chunk Series, 800 feet below the base of the Pottsville, 2500 feet above the Greenbrier Limestone, and averaging about 40 feet in thickness at its type locality—Princeton, Mercer County—is a very pronounced cliff rock in Fayette, attaining even a greater development in this County than in the former. Here, in its typical development, it is usually a massive, conglomeratic sandstone, carrying more and larger quartz pebbles than any of the Pottsville ledges above it. Its thickness and stratigraphic position are exhibited in the General Section of the Mauch Chunk Series published in Chapter IV, page 113, and in the special sections published in the same Chapter for Royal, Terry, Quinnimont—South Side, Meadow Creek Station, and Beurytown; and in the logs of coal test boring No. 56 on Map II, published in Chapter XI. On pages 249-50 of the Wyoming-McDowell Report of the State Survey, the author has suggested its correlation with the "Maxton Sand" of the oil well drillers in the northwestern region of the State. The log of the latter boring and its interval—250 to 375 feet—below the base of the Pottsville Series along its outcrop on the valley walls of New River above Stonecliff, and those of Meadow Creek southwestward from Gwinns Siding, tend to corroborate this correlation.

This sandstone is widely persistent on northeastward along the outcrop of its horizon in great conglomeratic cliffs on the headwaters of Cherry, Cranberry, and Williams Rivers, tributaries of the Gauley, across southeastern Nicholas and Webster Counties and northwestern Greenbrier and Pocahontas, onto the drainage of Cheat River in Randolph County, according to a verbal communication of D. B. Reger, who recently gathered data in the field throughout this region for Reports on Webster and Nicholas.

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[1] M. R. Campbell, Pocahontas Folio, No. 26, U. S. Geol. Survey; 1895.

At the mouth of Meadow Creek on New River it crops in a bold cliff 75 to 90 feet in height, over 800 feet above the bed of the latter stream. Passing down the river from this point the conglomerate gradually becomes thinner until it practically disappears just above the axis of the Mann Mountain Anticline. Just below the mouth of Glade Creek it reappears in conglomeratic form and makes almost a continuous line of cliffs along both valley walls of New River to the lower end of the "Stretcher Neck" bend of the latter stream, beyond which it practically disappears, its horizon dipping below the river near Stonecliff.

Northeastward from Meadow Creek Station it forms great cliffs along the valley walls of Meadow Creek to just above Gwinns Siding where it passes below drainage. The great conglomeratic boulders strewed along the valley floor and walls of the latter stream have mostly broken off from the cliffs of this sandstone. It is this ledge that was once operated at **Sandstone Quarry No. 9 on Map II,** on the east hillside of Meadow Creek, 0.4 mile southward from Meadowbridge (Clute P. O.), at an elevation of 2385′ B., as determined by the author. Here, the quarry-face is about 400 feet long, 25 to 35 feet high, and is worked back eastward into the hill a distance of 50 to 75 feet. The stone obtained was crushed here and used for ballast in the construction and maintenance of the Sewell Valley Railroad. It varies from greenish-gray to grayish-white in color and is coarse-grained, very hard, and pebbly.

Northeastward from Meadowbridge this sandstone forms the valley floor of Meadow Creek for slightly over a mile. Here it belongs about 1170 feet below the horizon of the Sewell Coal, 520 feet below the No. 3 Pocahontas bed and 350 to 360 feet below the top of the Mauch Chunk Series.

THE TERRY LIMESTONE.

The marine fossiliferous Terry Limestone of Krebs[2], belonging at its type locality—Terry, Raleigh County—1130 feet below the Sewell Coal, 450 feet below the No. 3 Pocahontas bed, 336 feet below the top of the Mauch Chunk Series, and 10 to 15 feet below the sandstone last described, should be present on the opposite side of New River from Terry in Fayette County. Its thickness and stratigraphic position are exhibited in the Terry Section published in Chapter IV, page 207. The latter shows 3 inches of **impure coal** 2 feet below the limestone in question. This evidently correlates with the **Pluto Coal** of Krebs[3], the latter belonging at its type locality—Pluto, Raleigh County—450 to 475 feet below the No. 3 Pocahontas Coal and 350 to 375 feet below the top of the Mauch Chunk Series. It is also the belief of the author that the marine fossiliferous **Upper Hinton Limestone,** shown by Krebs on page 167 of the report last cited, is one and the same with the Terry ledge, as it belongs at practically the same interval below the top of the last-mentioned series.

Eight to nine miles northward from Terry in the western edge of Sewell Mountain District, the author measured the following section at the crop of a marine fossiliferous horizon on the north bank of Ephraim Creek, 0.2 mile southeast of Pennbrook railway station, that may possibly correlate with the Terry Limestone, although it appears to belong at a considerably less interval—950 feet—below the horizon of the Sewell Coal than the exposures last given above:

	Feet.
Shale, black, with Lingula fossil shells abundant.......	20
Shale, sandy, ferriferous, with crinoids and other fossil shells abundant (1140′ B.)...........................	1

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[2] C. E. Krebs, Raleigh County Report, W. Va. Geol. Survey, p. 69; 1916.

[3] Loc. cit., pp. 74 and 635.

PART III.

Mineral Resources

CHAPTER X.

PETROLEUM AND NATURAL GAS

OIL AND GAS HORIZONS IN WEST VIRGINIA.

No oil has yet been produced from the total of nine wells that have been completed within Fayette County and of these only two—Nos. 9 and 11 on Map II, described fully on subsequent pages of this Chapter—have produced gas in paying quantities. The opening of the rich Berea Sand oil pool on Cabin Creek in December, 1914, by the Ohio Cities Gas Company, 6 miles westward from Fayette, has attracted considerable attention recently to the northwest border of the latter County on the possibility that its northeast extension may reach this region. The zones in which the oil and gas are likely to occur are the sandstone members of the Pennsylvanian, Mississippian, and Devonian, as in the developed fields of other portions of the State. In the latter area no oil or gas in commercial amounts has yet been found in the Permo-Carboniferous or Dunkard Series immediately above the Pennsylvanian or in the Chemung and Portage divisions of the Devonian, with the exception of the Benson Sand[1] of Barbour County. The "Big Lime" or Greenbrier Limestone of the

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[1] D. B. Reger, Barbour-Upshur-Randolph Report, W. Va. Geol. Survey, pp 85-6 and 310; 1918.

Mississippian is the only calcareous member that has produced oil and gas in West Virginia.

The following table gives the names and classification of the several oil and gas zones in this State, as published, with the addition of the Benson Sand, on page 280 of the Braxton-Clay Report prepared by the author for the State Geological Survey, the zones that have proved productive in Fayette and in the immediately adjoining portions of Nicholas, Clay, and Kanawha Counties being printed in **black face type:**

Table Showing Oil and Gas Zones of West Virginia.

Pennsylvanian:	
Monongahela Series	Carroll Sand (Uniontown).
Conemaugh Series	Minshall Sand (Connellsville). Murphy Sand (Morgantown). Moundsville Sand (Saltsburg). First Cow Run or Little Dunkard Sand (Buffalo). Big Dunkard Sand (Mahoning).
Allegheny Series	Burning Springs Sand (Upper Freeport). Gas Sand of Marion and Monongalia Counties (Lower Freeport).
Pottsville Series	Second Cow Run of Ohio (Homewood). Cairo Gas Sand. Cairo Salt Sand (Connoquenessing). Cairo ? Rosedale Gas Sand. Rosedale Salt Sand.
Mississippian:	
Mauch Chunk Series	**Maxton, Dawson,** Cairo? Little Lime.
Greenbrier Limestone	Big Lime, not generally productive.
Pocono Sandstones	**Keener Sand** and Beckett **Sand** of Milton. **Big Injun Sand.** **Squaw Sand.** **Weir Sand.** **Berea Sand.**

Devonian:

Catskill Red Beds	Gantz Sand. Fifty-foot Sand. Thirty-foot Sand. Gordon Stray Sand. Gordon Sand. Fourth Sand. Fifth or McDonald Sand. Sixth or Bayard Sand. Seventh or Elizabeth Sand.
Chemung and Portage Beds	Warren First or Second, Tiona, Speechley and Benson Sands. No well-defined oil or gas horizons yet discovered in West Virginia.

Within Fayette not all the sands marked in **black face** in the foregoing table have produced oil or gas in paying quantities, as only the Big Injun and Weir come under this category, these having produced gas in commercial amounts near Belva and Montgomery, respectively. Owing to the rapid expansion of the Pottsville and Mauch Chunk Series southward and southeastward across the county, it is practically impossible to devise a set of intervals from some known surface stratum down to the producing sands that would apply over a very large portion of the County. As a substitute the reader is referred to the two tables at the beginning of Chapter III, pages 88-89, for the Big Injun Sand; to the summarized table of well logs on subsequent pages of this Chapter; and to the complete records of several wells for detailed information on any particular locality.

DESCRIPTION OF OIL- AND GAS-BEARING SANDS.

THE MAXTON SAND.

The Maxton Sand, belonging in the Mauch Chunk Series and probably correlating with the **Princeton Conglomerate Sandstone**, described in Chapter IX, page 333, has not produced either oil or gas in commercial quantity in Fayette, but in the western point of Nicholas County, slightly less than one mile northeast of Belva at the mouth of Twentymile Creek, a fine show of oil was found in this sand in the H. O. Havener Well No. 2—No. 6 on Map II. In the northwestern counties of the State it has proved a very prolific zone for both oil and gas.

THE BIG LIME.

The "Big Lime" or Greenbrier Limestone of the Mississippian carried quite a strong flow of gas in the A. D. Huntington No. 3 Well—No. 20 on Map II—near the head of Hughes Creek in Kanawha County, less than 2 miles from the Fayette line, and shows of gas in Wells Nos. 11 and 15 on the same map within the latter County. The oil from this zone is usually darker and heavier than that found in the sands, but thus far none has been found in it in the territory of this Report.

THE KEENER SAND.

The Keener Sand, belonging directly below the zone last described, representing at its type locality—Keener farm near Sistersville, West Virginia—a split off the Big Injun proper of western Pennsylvania, and ranging in thickness at Sistersville from 20 to 40 feet, has not produced either oil or gas in Fayette, but shows of the latter are reported from it in the H. O. Havener No. 1 Well—No. 8 on Map II—1.5 miles northward from Belva.

THE BIG INJUN SAND.

The Big Injun Sand or top member of the Pocono Sandstone Series, as limited in West Virginia, frequently includes in one sandstone mass the zone last described, an underlying middle member, and the still lower Squaw and Weir Sands. In eastern Kanawha and western Fayette it is usually limited to the first reddish member below the Big Lime, the Keener in this locality usually being absent; or if present, being gray in color. A good flow of gas is reported from this zone in the **Newman No. 1 Well—No. 9 on Map II**—0.6 mile due south of Belva, the detailed log of which is published in Chapter IV, pages 134-5, in connection with the Belva—0.7 Mile South Section. A trace of oil is reported from it in the log of the Havener well mentioned above under the description of the **Keener Sand.**

THE WEIR SAND.

The Weir Sand of Krebs[2], belonging at its type locality—Weir, Kanawha County—350 to 390 feet below the top of the Big Lime, is present in Fayette and appears to occupy the same zone as the Squaw Sand of the northern portion of the State. A fine flow of gas was encountered in this sand at the Montgomery Heirs No. 1 Well—No. 11 on Map II—on the south hillside of the Kanawha River at the west edge of Montgomery. Westward in Kanawha County it has been a prolific gas producer as shown in several wells on Map II and listed in the Table of Wells on a subsequent page of this Chapter.

THE BEREA SAND.

The Berea Sand or basal member of the Pocono Sandstone Series is a very rich oil and gas zone immediately westward from Fayette in Kanawha County, the great Cabin Creek oil field of the latter area getting its production entirely from this sand. It belongs 660 to 690 feet below the top of the Big Lime, directly below 15 to 25 feet of brown shale, and ranges in thickness from 20 to 45 feet. Thus far it has proved barren in the limited number of test wells within Fayette. In fact it appears to be very irregular in thickness and physical structure, frequently being represented by only a thin "shell".

WELL RECORDS AND PROSPECTIVE AREAS.

SUMMARIZED RECORDS.

The following table gives a list of all the test wells for oil and gas that have been drilled in Fayette, grouped by magisterial districts, along with many others from the immediately adjoining portions of Nicholas, Kanawha and Raleigh Counties. It gives not only the serial number designating each well in the text and on Map II, but also its elevation above sea-level, the depth to the top and thickness of the Big Lime, Big Injun, and Berea Sands and the character of the

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[2] C. E. Krebs, Kanawha County Report, W. Va. Geol. Survey, pp. 302-3; 1914.

Summarized Record of Oil and Gas Wells in Fayette County.

No. on Map II.	Local Farm Name and Number	Magisterial District	Owner.	Elevation. (A.T.)	Big Lime.		Big Injun.		Berea.		Total Depth	Producing Sand and Remarks.	No on Map II
					Depth. (Top.)	Thickness.	Depth. (Top.)	Thickness.	Depth. (Top.)	Thickness.			
1	E. V. Shelton No. 1	Jefferson (Nicholas)	Lackawanna	1050B.								Dry hole; gas show	1
2	Lackawanna Coal & Lumber Co.	Jefferson (Nicholas)	Lackawanna	1115B.								B. Lm. gas	2
3	Lackawanna Coal & Lumber Co.	Jefferson (Nicholas)	Lackawanna	925B.								Dry hole	3
4	C. D. Backus No. 1	Jefferson (Nicholas)	Lackawanna	780B.			1775	40			2282	Dry hole; B. I. gas show	4
5	Lackawanna Coal & Lumber Co.	Jefferson (Nicholas)	Lackawanna	710B.							(2000)	Dry hole	5
6	H. O. Havener No. 2	Jefferson (Nicholas)	Lackawanna	698L.							1377	Maxton oil 30 bbls. at first	6
6A	Hill Long No. 1	Jefferson (Nicholas)	Dunbar O. & G.	(812L.)	1595	142	1742	95	2176	35	2275	B. Lm. gas	6A
7	Hill-Long No. 2	Jefferson (Nicholas)	Benedum-Trees									Dry hole through Berea	7
8	H. O. Havener No. 1	Jefferson (Nicholas)	Lackawanna	785	1597	151	1770	41	2219	6	2235	Dry hole; Knr. gas show; B. I. oil trace	8
9	Newman No. 1	Falls	C. O. G. Co.	746L.	1490	161	1651	99			1840	B. I. gasser	9
10	Kanawha-Gauley C. & C. Co. No. 1	Falls	Ohio Fuel	975B.	1809	225	2034	59		0	3051	Dry hole	10
11	Montgomery Heirs No. 1	Kanawha	Ira Sayres	717L.	1665	225	1890	60			2045	Weir gasser; B. Lm. gas show	11
12	Montgomery Heirs No. 2	Kanawha	Ira Sayres	714L.	1640	150	1875	50	2358		2408	Dry hole; Weir gas show	12
13	J. A. Buster No. 1	Falls	Jacks Branch	640								Dry hole	13
13A	Kanawha & Hocking C. & C. Co. No. 1	Falls	G. L. Cabot	670B.	1370	247	1617	73			2238	B. Lm. and Weir gas	13A
14	Powellton Well	Kanawha		935B.	1620	336	1956	111	2456	0	2895	Dry hole	14
15	Gallego No. 1	Kanawha	Wayland O. & G.	985B.	1568	302	1870	25	2464	23	3118	Dry hole; B. Lm. and Weir gas shows	15
16	Thayer Well	Quinnimont	Wm. Freudenberger	(1115B.)							?	Dry hole	16
17	McCreery Well	Quinnimont	Capt. Thos. Allen	(1225B.)							1600	Dry hole	17
17A	McKendree Well	Quinnimont	Thos. Allen	1130B.							?	Dry hole	17A
17B	Gwinn No. 1	Summers County	Green Sulphur O. & G.	1550B.	905	695	1625	75	2200	25	3000	Gas shows only	17B
18	Rowland Land Co. No. 1	(Raleigh Co.)	Coal River O. Co.	1320L.	1750	400	2150	0	2920	45	3434	Dry hole; B. Lm. gas show	18
19	A. D. Huntington No. 1	Cabin Creek (Kanawha)	Wayland O. & G.	854L.	1741	180	1965		2427	33	2622	Dry hole; Weir gas show; Berea oil smell	19
20	A. D. Huntington No. 3	Cabin Creek (Kanawha)	Wayland O. & G.	1115B.	2021	202	2223	60	2705	20	3000	B. Lm. gas; Berea shelly	20
21	A. D. Huntington No. 5	Cabin Creek (Kanawha)	Wayland O. & G.	669L.	1616	196	1812	63	2290	40	2341	B. Lm., Weir, and Berea gas; Berea good, soft	21
22	A. D. Huntington No. 2	Cabin Creek (Kanawha)	Wayland O. & G.	704L.	1649	143	1792	108	2329	13	2364	B. Lm. and Berea gas	22
23	A. D. Huntington No. 4	Cabin Creek (Kanawha)	Wayland O. & G.	651L.	1510	190	1700	50	2176	42	2265	Dry hole; B. Lm. gas show; Berea, hard, glassy	23
24	A. D. Huntington No. 6	Cabin Creek (Kanawha)	Wayland O. & G.	620B.	1592	161	1753	60	2215	95	2340	B. Lm. gas at 1640′	24
25	Ward Heirs No. 9	Cabin Creek (Kanawha)	United Fuel	715B.								Weir oil, 50 to 75 bbls. daily at first	25
26		Cabin Creek (Kanawha)										Weir gasser	26
27		Cabin Creek (Kanawha)								8		Weir gas, 2,000,000′ daily at first	27
28		Cabin Creek (Kanawha)								20		Dry through Berea Sand	28
29	Keystone Coal Co. No. 1	Cabin Creek (Kanawha)	United Fuel	950L.	1895	235	2130	45			2301	Weir gasser	29
30	John Q. Dickinson No. 1	Cabin Creek (Kanawha)	South Penn	937L.	1933	180	2113	48			2246	Weir gasser	30
31	B. H. Early No. 1	Cabin Creek (Kanawha)	Ira Sayres	622L.	1557	158	1715	125	2255		2310	Weir gasser, ½ million feet daily	31
32	Paint Creek Land & Coal Co. No. 1	Cabin Creek (Kanawha)	Unitel Fuel	770B.	1725	170			2350	39	2452	700,000′ gas in Berea	32
33	Paint Creek Land & Coal Co. No. 2	Cabin Creek (Kanawha)	United Fuel	733L.	1740	190			2408	4	3029	Dry hole; Berea only a shell	33
34	Lackawanna C. & L. Co.	Cabin Creek (Kanawha)	United Fuel	1285B.	2257	211			2947	4		Dry hole; Berea only a shell	34
35	Coalburg Colliery Co. No. 1	Cabin Creek (Kanawha)	South Penn	768L.	1709	128			2364	16	2399	Berea gas, 2.2 million feet; R. P.=390 lbs.	35
36	Coalburg Colliery Co. No. 2	Cabin Creek (Kanawha)	South Penn	795L.	1757				2415	50		B. Lm. gas show 10 bbl. Berea oil show at 2433′	36
37	Imperial Coal Co. No. 11 (912)	Cabin Creek (Kanawha)	United Fuel	886L.	1939				2603	31		Dry hole; Berea oil light	37
38	Fairfield Well	Cabin Creek (Kanawha)	South Penn	768L.	1820	220			2488	22		Berea oil show	38
39	Lackawanna C. & L. Co.	Cabin Creek (Kanawha)	United Fuel	1285B.	2257	211			2947	4		Dry hole; Berea only a shell	39
40	Shonk Garrison Coal Co. No. 1	Cabin Creek (Kanawha)	West Penn	940B.	1990	170			2699	17	2700	B. Lm. gasser small	40
41	Shonk Garrison Coal Co. No. 3	Sherman (Boone)	Ohio Cities									Dry hole through Berea	41
42	Williams Coal Co. No. 36	Cabin Creek (Kanawha)	Ohio Cities	751L.					2372	30		Berea oil, 30 bbls. initial daily	42
43	Williams Coal Co. No. 56	Cabin Creek (Kanawha)	Ohio Cities	707L.	1700				2359	49		Berea oil, 400 bbls. initial daily	43
44	Williams Coal Co. No. 60	Cabin Creek (Kanawha)	Ohio Cities	646L.	1760	228			(2327)	31	2361	Berea oil, 50 bbls. initial daily	44
45	Williams Coal Co. No. 50	Cabin Creek (Kanawha)	Ohio Cities	803L.	1795				2427	38		Berea oil, 200 bbls. initial daily	45
46	Williams Coal Co. No. 54	Cabin Creek (Kanawha)	Ohio Cities	804L.					2466	30		Berea oil, 20 bbls. initial daily	46
47	Williams Coal Co. No. 2	Cabin Creek (Kanawha)	Ohio Cities	884L.					2460			Berea oil, 60 bbls. initial daily	47
48	Williams Coal Co. No. 13	Cabin Creek (Kanawha)	Ohio Cities	1513L.	2510	210	2720	16	3160	30	3196	Berea oil, 100 bbls. initial daily	48
49	Williams Coal Co. No. 40	Cabin Creek (Kanawha)	Ohio Cities	918L.	1975	223			2621	21	2650	Berea oil, produced only 4 bbls. and abandoned	49
50	Williams Coal Co. No. 12	Cabin Creek (Kanawha)	Ohio Cities	1609L.	2590				3233	42	3282	Berea oil, 300 bbls. initial daily	50
51	Williams Coal Co. No. 68	Cabin Creek (Kanawha)	Ohio Cities	1576L.	2578	230			3215	37	3254	Berea oil, 250 bbls. initial daily	51
52	Williams Coal Co. No. 1	Cabin Creek (Kanawha)	Ohio Cities	862L.	1815	190			2482	38	2520	First well in field, Berea oil. 200 bbls. daily at first	52

well in all cases where these data could be obtained, along with the total depth and the name of the producing zones. In the elevation column, the latter "B" indicates barometric determinations, checked by U. S. Geological Survey spirit-levels; and the letter "L", spirit-level measurements. Throughout the text, the name of any well, when mentioned, is accompanied by its corresponding serial number on Map II, and under the column headed "Owner", an effort has been made to obtain the official name of the operating company. The following abbreviations of company names have been used in this column:

Abbreviations.	Full Names.
Benedum-Trees - - - -	Benedum-Trees Oil Company.
Coal River O. Co. - - -	Coal River Oil Company
C.O.G. Co. - - - - - -	C. O. G. Company.
Dunbar O. & G. - - - -	Dunbar Oil & Gas Company.
Green Sulphur O. & G. - -	Green Sulphur Oil & Gas Company.
Jacks Branch - - - -	Jacks Branch Oil & Gas Company.
Lackawanna - - - - -	Lackawanna Coal & Lumber Company
Ohio Cities - - - - -	Ohio Cities Gas Company.
Ohio Fuel - - - - -	Ohio Fuel Oil Company.
South Penn - - - - -	South Penn Oil Company.
United Fuel - - - - -	United Fuel Gas Company.
Wayland O. & G. - - -	Wayland Oil & Gas Company.
West Penn - - - - -	West Penn Oil Company.

Under the column headed "Remarks" in the accompanying table, the following abbreviations are used for the names of oil and gas zones:

Abbreviations.	Names of Zones.
B. Lm. - - - -	Big Lime,
Knr. - - - -	Keener Sand.
B. I. - - - -	Big Injun Sand.

In addition to the abbreviated logs in the accompanying table, a number of the detailed logs of the wells will be given on subsequent pages, which exhibit many features of importance that could not be shown in the table. Many of these are defective to the extent that important items that should have been recorded are lacking, but a number are quite detailed.

DETAILED WELL RECORDS IN FALLS DISTRICT AND THE ADJOINING PORTION OF NICHOLAS COUNTY.

Falls District occupies the northern border of Fayette, adjoining the Counties of Kanawha, Clay, and Nicholas. Its surface rocks belong in the Allegheny Series and in the Kanawha and New River Groups of the Pottsville. As shown on Map II, its eastern portion is traversed in a northwest-southeast direction by the Mann Mountain Anticline, the total structural relief, as exhibited by the No. 2 Gas Coal contours on Map II, being 1800 feet from the northwestern point of the District to the intersection of the axis of the fold last mentioned with the Falls-Mountain Cove District Line. A description of 9 wells that have been completed in the adjoining portion of Nicholas County will now be given.

The **E. V. Shelton No. 1 Well—No. 1 on Map II**—located on Otter Creek, tributary to Peters Creek, one-eighth mile west of Lockwood, at an elevation of 1050′ B., as determined by D. B. Reger and starting in the Gilbert Shale, was a dry hole. This well was completed by the Lackawanna Coal & Lumber Company and only a show of gas and much water were found.

The **Lackawanna Coal & Lumber Co. Well—No. 2 on Map II**—located on the west bank of Little Elk Creek, 0.4 mile north of the mouth of Upper Elk Hollow and 2.4 miles northeast of Swiss, and drilled by the owners of the land, is a fair gas well, its production now supplying the towns of Swiss and Jodie with domestic fuel, according to D. B. Reger. The latter reports the Big Lime as the gas zone, but he was unable to obtain the log of the boring or to learn the rock pressure and volume of gas encountered. This well is evidently just on the west side and near the crest of the Mann Mountain Anticline as the latter continues its course northwestward from Gauley River into Nicholas County.

The **Lackawanna Coal & Lumber Co. Well—No. 3 on Map II**—drilled by the owners of the land and located on the north bank of Lilly Branch of Twentymile Creek, 1.1 miles southeast of Vaughan, was a dry hole, according to D. B. Reger, starting at an elevation of 925′ B., at the base of the

Monitor Sandstone. He was unable to obtain the log of this well but it was probably drilled below the Big Injun, possibly through the Berea.

The **C. D. Backus No. 1 Well—No. 4 on Map II**—drilled by the Lackawanna Coal & Lumber Company in September, 1913, and located on the east bank of Twentymile Creek at the mouth of Big Hollow, 0.8 mile south of Vaughan, was practically a dry hole through the Berea. According to information given D. B. Reger by the landowner, Mr. Backus, it was drilled to a total depth of 2282 feet, shows of gas being found in a shallow sand and in the Big Injun. The well was plugged and later the gas broke through in sufficient quantities to furnish domestic fuel for Mr. Backus during the last two years. This well starts at an elevation of 780′ B., only 5 feet below an opening in the Eagle Coal, according to Reger.

The **Lackawanna Coal & Lumber Company Well—No. 5 on Map II**—located on the north bank of Twentymile Creek, 1.2 miles northeast of Belva and completed by the landowners in February, 1914, to a depth of about 2000 feet, was a dry hole, according to Teets. It starts at an elevation of 710′ B., or 190 to 200 feet below the No. 2 Gas Coal and must have penetrated the Big Injun Sand but not the Berea. The former should belong here about 1850 feet below the coal in question, and the latter about 450 feet deeper.

The **H. O. Havener No. 2 Well—No. 6 on Map II**—located on the south bank of Twentymile Creek, 0.8 mile northeast of Belva, was completed in June, 1913, by the Dunbar Oil & Gas Company, to a depth of 1377 feet through the Maxton Sand. According to information furnished by Geo. A. Cunningham, Chief Engineer of the United Fuel Gas Company of Charleston, W. Va., when the oil pay was tapped in the Maxton, it flowed 30 barrels in 20 minutes and then stopped, a cave below the casing closing in the well. He also reports 1130 feet of 6⅝-inch casing used. The Survey was unable to obtain the log of this boring.

The log given next below was erroneously published on pages 346-7 and 378 of the Braxton-Clay Report of the State Geological Survey through a confusion of farm numbers as representing the **Hill-Long No. 2 Well—No. 7 on Map II**—

located on the west bank of Open Fork, 0.3 mile south of Bentree (formerly Carterboro). The last-mentioned well was a dry hole probably through the Berea, but the Survey was unable to obtain its record:

Hill-Long No. 1 Well Record (No. 6A on Map II).

Jefferson District, Nicholas County, 0.8 mile northeast of Belva on south hillside of Twentymile Creek, 500 feet southeast of H. O. Havener No. 2 (No. 6 on Map II); authority S. M. Dunbar and C. E. Krebs; drilled by Dunbar Oil & Gas Company; completed May, 1914; elevation 812′ L.

	Thickness. Feet.	Total. Feet.
Loose dirt	15	15
Sand	30	45
Slate	30	75
Sand	35	110
Slate, hard	120	230
Sand	10	240
Slate	10	250
Lime	45	295
Conglomerate, Dotson	15	310
Slate	5	315
Sand, loose, Lower Dotson	85	400
Slate	5	405
Coal, Lower Douglas	3	408
Sand, Upper Nuttall	92	500
Lime, sandy	42	542
Coal, show, "Hughes Ferry," Iaeger	2	544
Lime, sandy	46	590
Slate	45	635
Sand, "Rosedale" Salt, hard, Harvey and Guyandot	190	825
Slate	25	850
Sandy lime, hard	65	915
Sand and lime, extra hard	225	1140
Slate cave	12	1152
Sand and shells	43	1195
Red rock	25	1220
Slate and shells	90	1310
Red rock	45	1355
Slate and shells	35	1390
Red rock	30	1420
Lime	35	1455
Lime, sandy, last 15′, Maxton	45	1500
Slate and lime shells	30	1530
Lime	30	1560
Slate	20	1580
Slate cave	15	1595
Big Lime (gas at bottom)	147	1742
Big Injun Sand	95	1837
Slate and shells	339	2176
Sand, Berea, broken	35	2211
Slate and shells to bottom	64	2275

The gas in bottom of lime; Casing record: Conductor, 11′; 10″. 350′; 8″, 1152′; 6⅝″, 1615.

The above well starts 100 to 110 feet below the No. 2 Gas Coal bed.

The following is the record of another dry hole located 1¼ miles northward that gives valuable details of the stratigraphy of this region. It is reported to have had a fine showing of gas in both the Keener and Big Injun Sands. It should start within 10 to 20 feet of the horizon of the No. 2 Gas Coal bed:

H. O. Havener No. 1 Well Record—No. 8 on Map II.

In Nicholas County, on Lick Branch, 0.4 mile northeast of Dixie; authority, E. A. Mead; completed, January 23, 1913; elevation, 785′ B.

			Thickness. Feet.	Total. Feet.
Soil			15	15
Sand (water at 65′)			65	80
Slate			10	90
Sand			20	110
Slate			50	160
Sand and lime shells			30	190
Slate			110	300
Sand, very hard			35	335
Slate and lime shells			120	455
Slate			33	488
Lime, very hard, gray			67	555
Lime, rotten, black			12	567
Lime, hard, gray			48	615
Sand, hard, gray			30	645
Slate and lime shells			35	680
Sand, hard, gray, (3 bailers of water)	20′	Lower Nuttall	70	750
Slate	5			
Slate, white	45			
Slate, black			5	755
Sand, white (little water), Harvey			70	825
Sand, gray, Guyandot			55	880
Slate and lime shells			25	905
Lime, hard, gray			25	930
Sand, white, Upper Raleigh			120	1050
Slate and lime shells			65	1115
Sand			5	1120
Lime, black			30	1150
Sand, gray			40	1190
Slate and lime shells			10	1200
Red rock			25	1225
Slate and lime shells			20	1245
Lime, gray			50	1295
Red rock			47	1342
Slate and lime shells			43	1385
Red rock			35	1420

	Thickness Feet.	Total. Feet.
Slate	10	1430
Sand, Maxton, top hard, bottom good	30	1460
Lime	131	1591
Pencil Cave	6	1597
Big Lime, regular	151	1748
Red rock, hard	8	1756
Sand, Keener (show of gas)	2	1758
Lime shells	12	1770
Sand, white, hard 16′ **Sand, red, coarse, trace of oil at 1807′; show of gas** 25 } **Big Injun**	41	1811
Shale and lime shells	389	2200
Shells, hard	13	2213
Shale, brown	6	2219
Sand, Berea	6	2225
Slate to bottom	10	2235

10″ casing, 20′; 8¼″ casing 480′; 6⅝″ casing, 1620′.

The detailed log of the **Newman No. 1 Well—No. 9 on Map II**—located in a west side branch of Gauley River, 0.7 mile due south of Belva, is published in Chapter IV in connection with the Belva—0.7 Mile South Section, pages 134-5. It was completed October 25, 1913, and was a fair gasser from both the Keener and Big Injun, having an initial volume of 1½ million cubic feet daily, according to Geo. A. Cunningham, Chief Engineer of the United Fuel Gas Company.

Three and a fourth miles southwestward in Falls District the United Fuel Gas Company completed, December 16, 1916, the **Kanawha-Gauley Coal & Coke Company No. 1 Well—No. 10 on Map II**—to a depth of almost 600 feet below the Berea Sand with no shows of oil or gas being reported. This well is located on Fourmile Fork of Smithers Creek, 0.3 mile southeast of Marting and its detailed log, as kindly furnished the Survey by the company last mentioned, is published in Chapter IV in connection with the Marting—¼ Mile Southeast Section, pages 123-4. Here the Maxton and Big Injun Sands were present in fair development but the Weir and Berea had thinned away entirely.

The **J. A. Buster No. 1 Well—No. 13 on Map II**—located in the southern edge of Falls District, 1¼ miles southeast of Boomer between the Kanawha & Michigan Railroad and the river, on the west bank of Jarrett Branch, and completed in 1914 by the Jacks Branch Oil & Gas Company, encountered a showing of gas in the Big Lime at about 1800 feet and was drilled to a depth of 2800 feet, according to information obtained by A. M. Hagan from M. J. Sims of Montgomery, W. Va. This well starts at an elevation of about 640′ B., or 550 feet below the No. 2 Gas Coal bed, so that the gas show evidently occurred near the horizon of the Berea Sand instead of the Big Lime, judging from the intervals prevailing at wells Nos. 11 and 12 on Map II at Montgomery, the logs of which are published on subsequent pages of this Chapter.

The following is the log of a well that was completed long after the field data for the Fayette Report were collected, the details and information concerning which were kindly furnished the Survey by C. E. Krebs of Charleston, W. Va. It starts in the interval separating the Upper and Lower Nuttall Sandstones:

Kanawha & Hocking Coal & Coke Company Well No. 1 (No. 13A on Map II).

Falls District, located at Glen Ferris, drilled by G. L. Cabot; began drilling May 14th; completed September 1st, 1918; elevation, 670′ B.; location on Map II as furnished by C. E. Krebs.

	Thickness. Feet.	Total. Feet.
Gravel	23	23
Sand	87	110
Slate and sand	75	185
Lime ?	20	205
Slate and sand	90	295
Sand	100	395
Slate	55	450
Sand	200	650
Slate	150	800
Lime shells	50	850
Sand	75	925
Red rock	50	975
Lime	15	990
Red rock	10	1000
Slate	15	1015
Lime	35	1050
White slate	40	1090
Lime	10	1100
Red rock	30	1130
Slate	15	1145
Red rock	20	1165
Lime	30	1195
Slate	5	1200
Sand, Maxton	55	1255
Slate	3	1258

	Thickness Feet.	Total. Feet.
Little Lime	37	1295
Break, unrecorded	3	1298
Lime	70	1368
Pencil Cave	2	1370
Lime, dark 30' Lime, white (gas at 1499'; water at 1555') 217 **Big Lime**	247	1617
Sand, Big Injun	73	1690
Sand, Weir, (gas at 1700')	20	1710
Slate and shells	330	2040
Shale	25	2065
Slate and shells to bottom	173	2238

Well shot and tubed for casing at 1700'.

13" casing, 23'; 10" casing, 63'; 8¼" casing, 1308'; 6⅝" casing, 1419'.

When the Big Injun was encountered, according to Krebs, this well showed gas at the rate of about 2,000,000 cu. ft. daily, but it soon diminished in size, and later when it was shot it showed only about 50,000 cu. ft. daily. It is tubed and being used for commercial purposes at Glen Ferris.

PROSPECTIVE OIL AND GAS AREAS, FALLS DISTRICT.

The test wells that have been thus far completed in Falls District are confined to that portion lying to the west of Gauley River and those that have been described on preceding pages from Nicholas County largely affect the same portion of the District, with the possible exceptions of Nos. 1 and 2 on Map II. Considerable gas was found in the Newman well—No. 9 on Map II—in the Keener and Big Injun Sands, the other two test wells within the District being dry holes. The latter two penetrated below the Berea but found no sand at the latter zone. As described more fully on a subsequent page of this Chapter, the recent completion of the dry hole—B. H. Early No. 1 (No. 31 on Map II)—through the Berea apparently shuts off the extension of the rich Cabin Creek oil field of Kanawha County northeastward into Fayette, a feature that is rather discouraging for the outlook of a possible Berea oil pool in that portion of the District west of Gauley River where the fixed carbon content of the coal beds is favorable, being under 65 per cent. There is a possibility, however, of a

Maxton oil pool in the Belva region in that portion of Falls District lying immediately southwest of the H. O. Havener No. 2 Well—No. 6 on Map II—in which a fine showing of Maxton oil was obtained in the Maxton Sand. Its extension to the northeast and southeast is shut off by the dry holes—Nos. 5 and 6A on Map II, respectively.

The eastern portion of Falls District is traversed in a northwest-southeast direction by the rapidly plunging Mann Mountain Anticline. The Lackawanna Coal & Lumber Company Well—No. 2 on Map II—described on a preceding page and located near the crest and just west of the axis of this fold, is a fair gasser from the Big Lime. Southeastward along the crest of this arch in Falls District the rocks are at a considerably higher structural level and may possibly hold a paying gas pool, although any test well for the sands of the Mississippian and Catskill in a region where the folding, with its consequently increased metamorphic action, has become more intense as the great folds of the Appalachian Mountain System are approached, would be accompanied by much greater financial risk than prevails on similar structure in the northwestern half of the State. This is further attested by the low volatile content of the coal beds. The fact that the latter have lost a considerable portion of their volatile gases since deposition tends to the probability that the oil and gas from the sands below may have escaped into the air long ago as a direct result of the same earth forces.

PROSPECTIVE OIL AND GAS AREAS, MOUNTAIN COVE DISTRICT.

Mountain Cove District lies immediately south of the eastern portion of Falls. Its outcropping rocks belong in the Allegheny Series and in the Kanawha and New River Groups of the Pottsville Series. No test wells for oil or gas have ever been drilled within its borders. Its eastern margin is traversed in a northwest-southeast direction by the Mann Mountain Anticline, a feature that causes its structural relief, as exhibited on Map II, to have a range of 1150 feet. The area belongs, however, in the region of low volatile coal beds, and for reasons mentioned above under the description of Falls District, it is doubtful if oil and gas in commercial quantities will be found in spite of the favorable structure for their gravimetric segregation.

DETAILED WELL RECORDS IN KANAWHA DISTRICT.

Kanawha District lies immediately south of the western half of Falls District on the southeastern slope of the Handley Syncline, its surface rocks belonging in the Allegheny Series and the Kanawha and New River Groups of the Pottsville. As shown by the structure contours on Map II, there is no marked interruption of the general northwest dip of the surface strata to indicate a corresponding interruption of the dip of the usually petroliferous sands, features that are an essential aid on such a monocline structure for the accumulation of commercial oil and gas pools. Four test wells have been drilled within the District, three of which were dry holes through the Berea Sand, the other, the log of which is given next below, is a fair gasser from the Weir Sand.

Montgomery Heirs No. 1—No. 11 on Map II.

Kanawha District, Fayette County, on south hillside of Kanawha River at Montgomery, 0.5 mile southeast of mouth of Morris Creek; drilled by Ira Sayres, authority for log; completed, July 31, 1917; elevation, 717' L.

	Thickness. Feet.	Total. Feet.
Soil and gravel	80	80
Lime	40	120
Shale (Eagle Shale horizon at base)	75	195
Lime	20	215
Sand, Upper Gilbert (9 bailers water per hour at 220')	30	245
Coal, Glenalum Tunnel	4	249
Slate	101	350
Gas Sand, Dotson (water to drill at 360')	50	400
Slate and shells	80	480
1st Salt Sand, Upper and Lower Nuttall	145	625
Slate	37	662
2nd Salt Sand, limy, Harvey and Guyandot, (hole full of water at 675')	208	870
Slate	5	875
3rd Salt Sand, slaty, Upper Raleigh	100	975
Slate	33	1008
Coal, Fire Creek ?	6	1014
Slate	41	1055
Sand	57	1112
Slate	6	1118

	Thickness Feet.	Total. Feet.
Red rock	5	1123
Lime	27	1150
Slate	15	1165
Red rock	20	1185
Slate	39	1224
Lime	4	1228
Red rock and shells	112	1340
Slate, black	18	1358
Sand	42	1400
Red rock	55	1455
Lime	10	1465
Slate and shells	35	1500
Red rock	30	1530
Sand, Maxton, (a little water at 1550′)	60	1590
Slate	5	1595
Little Lime	30	1625
Slate	6	1631
Lime shells	7	1638
Pencil Cave	27	1665
Big Lime	132	1797
Big Lime, gritty (show gas at 1860′)	93	1890
Big Injun Sand	60	1950
Slate and shells	34	1984
Sand, Weir (1267′ L., B. T.) (gas pays at 1998′-2018′ and 2015-2020′)	43	2027
Slate to bottom	18	2045

Tubed, 2″ tubing; 6⅝x2 anchor packer, set at 1847′; perforation, 1995′ to 2010′; casing: 13″ wood conductor, 16′, pulled out; 12½″ Drive Pipe 70′, pulled out; 10″ casing, 350′, pulled out; 8¼″, 1224′, pulled out; 6⅝″, 1710′, pulled out.

The above well starts about 60 feet below the crop of the No. 2 Gas Coal bed, and is reported to have had an initial volume of 1½ million cubic feet daily with a rock pressure of 560 pounds to the square inch. In November, 1917, the gauge showed it putting 450,000 feet daily into the line for Montgomery local supply.

Montgomery Heirs No. 2—No. 12 on Map II.

Kanawha District, Fayette County on south side of Kanawha River at Montgomery, 0.9 mile east of mouth of Morris Creek; authority, George E. Miller; drilled by Ira Sayres; completed, November 27, 1917; elevation, 714′ L.

	Thickness. Feet.	Total. Feet.
Gravel, quicksand, (Eagle Coal horizon at 80′)	85	85
Slate and shells	105	190
Sand (6 bailers water per hour)	10	200

	Thickness Feet.	Total. Feet.
Slate	35	235
Coal, Glenalum Tunnel	4	239
Slate and shells	231	470
Sand, Upper and Lower Nuttall	135	605
Coal, Hughes Ferry	2	607
Slate, lime and sand	255	862
Coal, Sewell	2	864
Slate, lime and sand, Upper and Lower Raleigh	111	975
Coal, Little Raleigh ?	5	980
Sand, Lower Raleigh	125	1105
Slate, lime, and sand	130	1235
Slate, lime, sand, and red rock	260	1495
Sand, Maxton, (water at 1550′)	63	1558
Little Lime	47	1605
Slate, black	12	1617
Lime, gray	7	1624
Sand, gray	6	1630
Pencil Cave	10	1640
Big Lime	150	1790
Lime, gritty (water at 1815′)	85	1875
Red sand, Big Injun	50	1925
Slate and shells	25	1950
Sand, Weir, (gas at 1957′)	62	2012
Slate and lime	308	2320
Shale, brown	20	2340
Lime, horizon of **Berea Sand** at top	60	2400
Slate, black, to bottom	8	2408

Casing record: 12½″, 70′, left in; 10″, 250′, left in; 8″, 1105′ pulled out; and 6⅝″, 1658′, 1350′ pulled out; 6⅝″ casing shot off fourth time.

The above well is located only 0.4 mile east of the Montgomery Heirs No. 1 gasser from the Weir Sand but was a dry hole through the Berea. The latter sand was absent entirely, its horizon belonging throughout the Kanawha Valley region just below the brown shale at 2320 feet. It starts 45 feet below the crop of the No. 2 Gas Coal bed.

The detailed log of the **Powellton Well—No. 14 on Map II**—located on the east bank of Powellton Fork of Armstrong Creek, just above the C. & O. Railroad station at Powellton, is published in Chapter IV, in connection with the section for the latter place, pages 159-161. It was a dry hole to a depth of over 400 feet below the Berea, the latter sand and those of the Upper Catskill being absent entirely. The top of the Big Injun Sand rises 150 feet in elevation above its position in well No. 11 on Map II at Montgomery, while the No. 2 Gas Coal bed rises 675 feet southeastward between the same

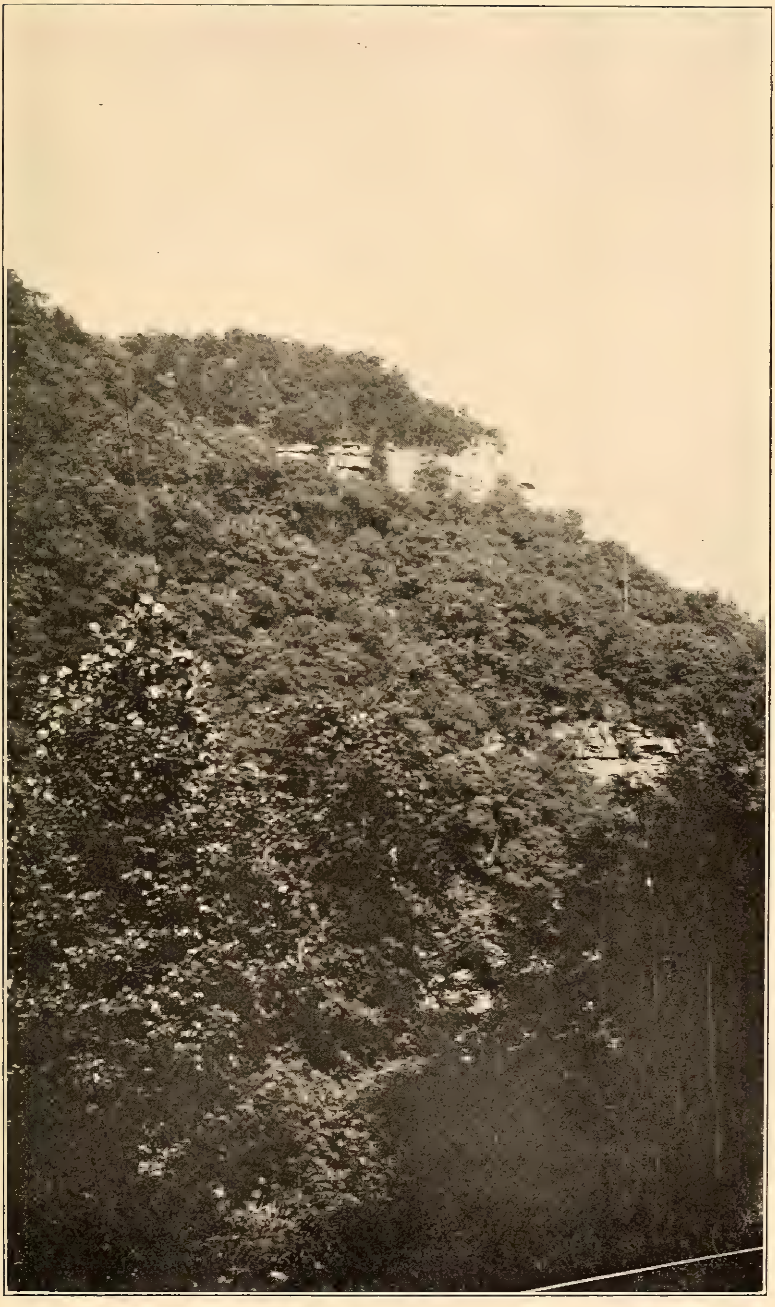

PLATE XII.—View showing outcrop exposures of Lower Nuttall (upper cliff) and Harvey Conglomerate Sandstones at "Lover's Leap Rock" shown on Plate XI.

points as exhibited on Map II. This discrepancy is due to the rapid expansion in the same direction of the intervening Pottsville and Mauch Chunk beds and the Greenbrier Limestone ("Big Lime").

The following is the log of a dry hole drilled in the southern portion of Kanawha District to a depth of 631 feet below the Berea. The 52 feet of sand at a depth of 2882 feet appears to represent the Gordon. Only shows of gas were found in the Big Lime and the Big Injun:

Gallego No. 1—No. 15 on Map II.

Kanawha District, Fayette County, on west bank of Paint Creek, 1.4 miles south of Mahan, at Krebs; authority, Geo. E. Miller; drilled by Wayland Oil & Gas Co.; completed, March 11, 1916; elevation, 985' B.

	Thickness. Feet.	Total. Feet.	
Conductor, surface (water at 15')	14	14	
Sand, hard, Lower Nuttall	96	110	
Coal, "Hughes Ferry," Iaeger	4	114	
Shale, broken	41	155	
Sand, hard, Harvey, Guyandot, Upper and Lower Raleigh (water at 320')	263	418	
Slate and sand	202	620	
Coal, Fire Creek?	6	626	
Sand and slate	289	915	
Lime and slate	85	1000	
Red rock	165	1165	
Lime and sand	109	1274	
Slate and lime	66	1340	
Red rock	42	1382	
Lime and slate	101	1483	
Slate and hard shells	73	1556	
Pencil Cave	12	1568	
Big Lime (small gas show at 1570')	302	1870	
Sand or lime, red, **Big Injun**	25	1895	
Lime, light-colored	85	1980	
Sand, red, **Big Injun**, (small show gas, 2109') (pay soft, lots of pebbles, 1994'-1998')	37	2017	
Sand, gray, Weir	16	2116	(?)
Slate, soft, and shells	299	2415	
Slate, dark	30	2445	
Shale, brown	19	2464	
Sand, Berea	23	2487	
Slate and shells	153	2640	
Unrecorded (slow drilling, 2640'-2742')	102	2742	
Slate, light-colored	140	2882	
Sand, Gordon	52	2934	
Sand, shells, and slate	66	3000	
Slate and shells to bottom	118	3118	

Casing used: Conductor, 14'; 10", 293', left in; 8¼", 850', left in; 6⅝", 1573', left in.

The above well starts 820 feet below the No. 2 Gas Coal bed and 110 feet below the top of the Upper Nuttall Sandstone, so that the coal encountered at a depth of 110 feet undoubtedly represents the Hughes Ferry bed. The top of the Big Injun Sand has risen 135 feet above its position in the Powellton Well—No. 14 on Map II—while the No. 2 Gas Coal bed rises 385 feet southward, or practically 3 times that for the former member.

The following is the record of a dry hole just recently completed 3 miles southward from the southern edge of Kanawha District, in Raleigh County. According to the structure contours on the Map accompanying the detailed Geological Report of Raleigh County for the State Survey, this boring should start about 485 feet below the Eagle Coal bed or about 725 feet below the No. 2 Gas seam. In this well the top of the Big Injun or base of the Big Lime is only about 50 feet higher than in the well last given, while the surface rocks, based on the Eagle Coal bed, have risen about 250 feet in the same distance:

Rowland Land Company No. 1—No. 18 on Map II.

Clear Fork District, Raleigh County, at mouth of Stovers Fork of Sycamore Creek, 0.3 mile southeast of Sycamore School; authority, W. P. Edwards; drilled by Coal River Oil Co.; completed, December, 1917; elevation, 1320′ L.

	Thickness. Feet.	Total. Feet.
Conductor and surface	14	14
Sand, "Mountain," Upper and Lower Nuttall	196	210
Coal, Hughes Ferry	5	215
Shale, broken	20	235
Sand, hard, Harvey, Guyandot and Upper Raleigh	310	545
Slate and shale	5	550
Sand, Lower Raleigh	90	640
Slate and shale	2	642
Sand, Quinnimont and Pineville	168	810
Slate, black	20	830
Sand	95	925
Shells and slate, red, cave	105	1030
Sand	15	1045
Slate and shells	145	1190
Sand	50	1240
Red rock	80	1320
Sand	50	1370
Slate and shells	130	1500

	Thickness. Feet.	Total. Feet.
Sand, red	155	1655
Sand	95	1750
Big Lime (about 50,000 cubic feet of gas that smelled oily at 1855′)	400	2150
Red rock, lime	25	2175
Lime, white	55	2230
Red rock	40	2270
Sand, Squaw, (with pebbles)	40	2310
Slate and shells	55	2365
Sand, Weir	45	2410
Slate and shells	510	2920
Sand, Gordon ?	45	2965
Slate and shells	75	3040
Lime	20	3060
Slate	60	3120
Slate and sand	135	3255
Sand	85	3340
Sand and slate to bottom	94	3434

PROSPECTIVE OIL AND GAS AREAS, KANAWHA DISTRICT.

The results found in well No. 18 on Map II above and in the other four in Kanawha District are not very encouraging, taken in connection with the continued northwest dip of the surface rocks without any marked interruption entirely across its area. The lack of such features in conjunction with its proximity to the region of the County carrying low-volatile coals, makes it appear very problematical whether oil and gas in commercial quantities will be found, with the exception of the small Weir Sand gas pool in the extreme northwestern point of the District. At the present stage of the development on the kind of structure that prevails as regards the surface rocks, any test well is accompanied by great financial risk or more or less a "shot at random."

LACK OF TEST WELLS IN NUTTALL, SEWELL MOUNTAIN AND QUINNIMONT DISTRICTS.

These three Districts occupy the eastern border of Fayette County, and, as shown in detail on Map II, the surface rocks, with the exception of a few narrow belts of Quaternary (alluvial deposits) along the valley floors of the larger streams, belong in the Pottsville Division of the Pennsylvanian and the Mauch Chunk of the Mississippian, the latter series being below drainage in Nuttall District. Only 3 wells have been drilled and all are located in the western edge of Quinnimont District. Inquiries failed to reveal them while the field work for this Report was being prosecuted during 1916, but their location and the data given below are on the authority of C. E. Krebs, formerly of the Survey Staff, from which it will be observed that these start low down in the Mauch Chunk below the Princeton Conglomerate (Maxton? Sand) and probably only the Thayer well penetrated to the Big Lime.

The **McKendree Well—No. 17A on Map II**—located in the west edge of Quinnimont District on the east side of New River at McKendree and completed more than 30 years ago by Capt. Thos. Allen, starts about 1400 feet below the Sewell Coal horizon and about 600 feet below the top of the Mauch Chunk Series. This is the well to which Krebs referred on page 373 of the Raleigh County Report for the State Survey. Its depth was not learned, but judging from the time it was drilled and the depth penetrated in the well next below, it is doubtful if the Big Lime was reached. Starting below the horizon of the Maxton Sand, it, of course, did not penetrate the only oil and gas zone thus far developed in the State for the Mauch Chunk Series.

The **McCreery Well—No. 17 on Map II**—located in the west edge of Quinnimont District on the northeast bank of New River opposite McCreery, was drilled by Capt. Thos. Allen more than 30 years ago to a depth of 1600 feet, according to data published by Krebs on pages 373-4 of the Raleigh County Report last mentioned. It starts 1100 to 1150 feet below the horizon of the Sewell Coal and about 350 feet below the top of the Mauch Chunk Series or near the horizon of the Princeton Conglomerate (Maxton?). As it is reported to have found only **"red rock and thin shells,"** the boring evidently did not penetrate to the Big Lime. The result is in harmony with the General Section of the Mauch Chunk Series published in Chapter IV, page 113. The well of course did not test any of the known oil and gas sands of the State.

Three to four miles southward from the territory of this Report, a very important test well was drilled for oil and gas in Summers County, the detailed log of which, as given next below, being taken from pages 377-8 of the Raleigh County Report for the State Survey. The well was abandoned as a dry hole, shows of gas only being found at depths of 2100, 2365, 2760, and 2825 feet. It was not visited by the author, but judging from the elevation of the horizon of the Sewell Coal, 5½ miles northeastward in the extreme eastern point of Quinnimont District, as exhibited by the structure contours on Map II, it probably starts about 2200 feet below this bed and about 1300 feet below the top of the Mauch Chunk Series. As the base of the latter belongs at a depth of 905 feet in the boring, this gives a thickness of over 2200 feet for the series. The top of the Big Injun Sand has an elevation of only 75 feet below sea-level, or a rise southeastward of 1098 feet from Well No. 11 on Map II at Montgomery in an air-line distance of 38.5 miles, or at the rate of 28.5 feet to the mile. The horizon of the Sewell Coal has risen southeastward about 3850 feet between the same points, or at the rate of 100 feet to the mile, thus revealing the enormous expansion of the intervening measures. The log of the well follows:

Gwinn No. 1 Well Record—No. 17B on Map II.

In Green Sulphur District, Summers County, on Lick Creek, 0.3 mile south of Green Sulphur Springs; completed, April 16, 1914; authority, Green Sulphur Oil & Gas Co.; elevation, 1550′ B.

	Thickness. Feet.	Total. Feet.
Gravel	20	20
Red rock	215	235
Slate, white	15	250
Lime, white	10	260
Slate, white	20	280
Red rock	20	300
Slate	30	330
Red rock	20	350
Slate, white	15	365
Red rock	25	390
Lime, black	20	410
Red rock	30	440
Slate, white	20	460
Red rock	40	500
Lime, black	10	510
Red rock	45	555
Slate, black	15	570
Sand	50	620
Slate, white	100	720
Lime, black	15	735

	Thickness. Feet.	Total. Feet.
Slate, white	3	738
Lime, black	17	755
Slate, white	10	765
Little Lime, black	65	830
Pencil Cave	75	905
Big Lime	695	1600
Slate, white	25	1625
Big Injun Sand	75	1700
Slate and shells	325	2025
Sand, gray, Squaw ?	15	2040
Shells, hard lime **(gas show at 2100′)**	60	2100
Slate	15	2115
Shells, hard lime	85	2200
Sand, white, Berea	25	2225
Shells, flinty	65	2290
Slate, black	50	2340
Lime and shells, flint, **(gas shows at 2365′ and 2760′)**	480	2820
Shale, black, **(gas show at 2825′)**	5	2825
Lime and flint	175	3000

In the above well the sands of the Pocono Series at the base of the Mississippian are well represented, but those of the Catskill division of the Devonian are absent entirely.

PROSPECTIVE OIL AND GAS AREAS IN NUTTALL, SEWELL MOUNTAIN AND QUINNIMONT DISTRICTS.

The area covered by these three Districts presents a much warped structure, as exhibited by the Sewell Coal contours on Map II. The latter shows the region traversed by three comparatively low anticlinal folds; viz. Mann Mountain, Ravenseye, and Boggs Knob, along with the associated synclines Clifftop, Lawton, and Springdale, features in the northwestern half of the State that would have been ideal for the segregation of oil and gas into commercial pools. The entire area, however, lies in a region carrying low volatile coal beds or those having more than 65 per cent. of Fixed Carbon. Hence, for reasons given on a preceding page under the discussion of Falls District, it is hardly probable that oil will be found in commercial quantities, although natural gas may occur on the most favorable structures. The well-trapped dome in the Mann Mountain Anticline, immediately northwest of Gentry is an ideal structure for the segregation of a rich oil and gas pool, were the conditions that are associated with the oil and gas fields of the States of Oklahoma, Kansas, and Wyoming prevailing, in that the main oil and gas sands in the latter States are usually saturated with water under a hydraulic head. In the Appalachian Basin, however, this is seldom true, and such structural forms would be expected to carry a rich gas pool, especially in the main oil and gas producing belt of the State, the exceptions being the oil pools along the crest of the Burning Springs and Sistersville Anticlines. A test well starting on the crest of this Mann Mountain dome inside of the 3000-foot contour of the Sewell Coal at about the horizon of the latter bed, should encounter the Princeton Conglomerate (Maxton? Sand) at a depth of about 1150 feet, while the Big Injun Sand would probably be found at least 2500 feet deeper. It will readily be seen that drilling on such favorable structures for gas as this dome and the Ravenseye and the Boggs Knob Anticlines is quite an expensive proposition to penetrate down to the usually best productive zones in southern West Virginia at the base of the Mississippian; viz, Big Injun, Weir, and Berea Sands. The chances are that gas might be found in paying quantities but the financial risk involved is so great, when all the factors are carefully considered, that the author hesitates to recommend the drilling of test wells even on the favorable structure mentioned.

RECENT OIL AND GAS DEVELOPMENT IN KANAWHA COUNTY.

The Cabin Creek Oil Pool.

Since the completion by C. E. Krebs, in August, 1913, of the Detailed Geologic Report of Kanawha County for the State Survey, one of the richest single producing oil pools yet opened in the entire Appalachian field was discovered in the Berea Sand during December, 1914, on the waters of Cabin Creek, Kanawha County, by the Columbus Producing Company (now The Ohio Cities Gas Company) on a tract of 12,000 acres owned by the Williams Coal Company. The initial well—No. 52 on Map II—located on the west bank of Longbottom Creek, just below the mouth of Laurel Fork, produced 200 barrels daily at first and was still making about 6 barrels daily on April 1, 1917. As shown by the blue contour lines on the Kanawha County region of Map II, the author has shown the lay of the main oil zone, the structure contours being based on the elevation **below sea-level** of the top of the Berea Sand. These contours reveal a marked discrepancy in the direction of the dip and the location of the axis of the Handley Syncline from that exhibited on the Geologic Map accompanying the Detailed Geologic Report for Kanawha County above mentioned, the contours on which were based on the Kanawha Black Flint cropping high in the hills in the region in question. These features are largely due to the very rapid southeast expansion of the intervening Pottsville and Mauch Chunk Series. Since the completion of the Williams Coal No. 1 Well—No. 52 on Map II, the development of the Cabin Creek oil pool has progressed very rapidly. In March, 1917, a total of 75 producing oil wells had been completed with a total production of about 3,000 barrels daily. Well No. 50 on Map II, completed January 5, 1916, with an initial production of 300 barrels daily, had produced a total of over 62,000 barrels by the end of March, 1917, and was still making over 40 barrels daily.

The sand is fairly close-grained, causing the wells to give up their production slowly, thus assuring a long life for the field. The pool has already been developed for a distance of 5 miles southeastward from Sharon, with a width of slightly over one-half mile, and as exhibited on Map II, closely following between the 1615- and the 1700-foot contours below sea-level of the top of the Berea Sand. The 1640- to 1650-foot levels are apparently in the richest portion of the belt. The Berea Sand in the developed portion of the pool ranges in thickness from 30 to 45 feet, the upper portion being hard down to the oil pay at 15 to 20 feet in the sand. The latter thins away rapidly southeastward from the pool as the axis of the Handley Syncline is approached, the softer basal half or "pay sand" being the first to disappear until only a "shell" remains of the original sand at its proper horizon directly below 15 to 25 feet of brown shale and 640 to 670 feet below the top of the Big Lime. The two following well records from this pool are of special interest. The first represents the initial well that opened the pool; and the second from the fact that it starts high on the summit of a mountain ridge about 30 feet below the base of the great pebbly, grayish-white and coarse Upper East Lynn Sandstone ledge of the Allegheny Series, thus giving a very complete detailed section of the underlying Pottsville:

Williams Coal Company No. 1—No. 52 on Map II.

Cabin Creek District, Kanawha County; 0.1 mile below the mouth of Laurel Fork of Longbottom Creek; drilled by The Ohio Cities Gas Company, authority for record; completed, December 18, 1914; elevation, 862′ L.

	Thickness. Feet.	Total. Feet.
Unrecorded	110	110
Coal	5	115
Unrecorded	650	765
Coal	4	769
Unrecorded	81	850
Salt Sand, (hole full of water at 1050′)	379	1229
Unrecorded	466	1695
Sand, Maxton	15	1710
Slate	20	1730
Cave, black	5	1735
Little Lime	45	1780
Break	3	1783
Little Lime	25	1808
Pencil Cave	7	1815
Lime, black	30	1845
Lime, white, Big	160	2005
Sand, pink	5	2010
Lime, white	35	2045
Sand, Keener	10	2055
Big Injun Sand	35	2090
Slate and lime	115	2205
Shells, hard	10	2215
Slate	185	2400
Lime, hard, black	35	2435
Slate, brown	27	2462
Slate, black	20	2482
Sand, Berea	38	2520

"Gas at 2199′; first show of oil at 2503′; shot February 9, 1915, 30 quarts, top of shot 2499′, bottom 2519′. Initial oil production 200 barrels daily and making 5 to 6 barrels daily on March 1, 1917."

Williams Coal Company No. 13—No. 48 on Map II.

Cabin Creek District, Kanawha County, on east hillside of Longbottom Creek near top of ridge 1.2 miles southwest of mouth of Left Fork; drilled by The Ohio Cities Gas Company, authority for log; completed, March, 1916; elevation 1513′ L.

	Thickness. Feet.	Total. Feet.	
Allegheny Series (40′)			
Sand, gray, East Lynn	40	40	
Kanawha Group, Pottsville Series (1285′)			
Slate, black (hole full of water)	80	120	
Sand	10	130	
Coal, Stockton	3	133	
Sand, Upper Coalburg	97	230	
Coal, Coalburg	4	234	
Sand, Lower Coalburg and Upper Winifrede (116′)	120	350	(?)
Coal, Winifrede	4	354	
Slate	36	390	
Sand, Upper Chilton	60	450	
Coal, Chilton	3	453	
Slate	37	490	
Lime	20	510	
Sandstone	35	545	
Slate (55)	65	600	(?)
Sand	60	660	
Slate	10	670	
Sand	30	700	
Slate	90	790	
Sandstone	20	810	
Coal, No. 2 Gas	5	815	
Slate	5	820	
Sand, Brownstown	25	845	
Slate	15	860	
Coal, Powellton	3	863	
Slate	27	890	
Sand	45	935	
Slate	35	970	
Lime	25	995	
Slate, Eagle ?	20	1015	
Sand	25	1040	
Slate	10	1050	
Lime	15	1065	
Slate	65	1130	
Lime	15	1145	
Sand	65	1210	
Slate, black	65	1275	
Lime [illegible]	50	1325	
New River and Pocahontas Groups, Pottsville Series (555′)			
Sand, black, Upper Nuttall	75	1400	
Sand, yellow, "[illegible]" (Lower Nuttall)	90	1490	
Slate, black	55	1545	
Salt Sand (hole full of water at 1670′)	335	1880	

	Thickness Feet.	Total. Feet.
Mauch Chunk Series (630′)		
Slate	10	1890
Lime	25	1915
Cave	10	1925
Lime	15	1940
Slate	5	1945
Lime	65	2010
Red rock cave	50	2060
Sand	30	2090
Slate	50	2140
Sand	15	2155
Slate	55	2210
Sand, close	20	2230
Lime	35	2265
Red rock	15	2280
Lime	40	2320
Slate	10	2330
Red rock	15	2345
Lime (Maxton)	25	2370
Slate	20	2390
Lime	50	2440
Slate	5	2445
Lime	10	2455
Pencil Cave	12	2467
Little Lime	23	2490
Slate, black	20	2510
Greenbrier Limestone (210′)		
Big Lime	210	2720
Pocono Series (470′)		
Sand, Big Injun	16	2736
Red rock	34	2770
Slate and shells	50	2820
Lime	25	2845
Slate, black	5	2850
Slate, black	50	2900
Lime, black	210	3110
Slate, black	25	3135
Shale, brown	25	3160
Sand, Berea (oil)	30	3190
Catskill Series, Upper Devonian (6′)		
Slate, to bottom	6	3196

"100 barrels daily at first from Berea Sand and still making 20 barrels daily on March 31, 1917."

This Cabin Creek oil pool corroborates in a marked manner the theory of gravity separation of petroleum and natural gas into commercial pools through the influence of geologic structure as first advanced and applied by White[3] in the successful location of oil and gas pools in western Pennsylvania and northern West Virginia. Throughout this region the Berea Sand is non-water-bearing, thus permitting the oil by the mere force of gravity to seek the lowest structural level down near the axis of the Handley Syncline that the lenticular nature of the Berea, as described above, will permit, while the natural gas in the same sand occurs at a higher structural level immediately northwest of the oil pool at about the 1615-foot contour of the Berea Sand and higher levels.

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[3] I. C. White, "Science," June 26, 1885; and W. Va. Geological Survey, Vol. I, pp. 159-187; 1899; and Vol. I(a), p. 48; 1904.

It appears very probable, after a careful study of the structure contours and the present stage of the development both as regards the oil and gas, that the extension of this oil pool northeastward from Paint Branch of Cabin Creek may swerve more to the eastward along the northwest slope of the Handley Syncline and follow closely along the 1650-foot contour of the Berea Sand via Wacomah on Paint Creek and possibly reaching onto the waters of Upper Creek in the vicinity of Wells Nos. 29 and 30 on Map II. The latter two wells are gassers from the Weir Sand, as shown in the Table of Wells published on a preceding page of this Chapter, and have not yet been drilled down to the Berea. The recent completion of the B. H. Early No. 1 Well—No. 31 on Map II—located on the east bank of Morris Creek in the west edge of the town of Montgomery—through the Berea in which the latter sand was represented only by thin "shells", as also at Well No. 12 on Map II, 0.8 mile farther east, and the Berea gas found at the higher structural levels in wells Nos. 21, 22, and 32 on Map II, leads the author to believe that it is hardly probable that this Cabin Creek Berea oil pool will cross the Kanawha River.

The detailed logs of six wells that have been drilled in Kanawha County northeastward from the Cabin Creek oil pool in an effort to find its extension in this direction will now be given:

A. D. Huntington No. 1—No. 19 on Map II.

Kanawha District, Kanawha County, on east bank of Shadrick Fork of Hughes Creek, 3.2 miles northeast of Hugheston; authority, Geo. E. Miller; drilled by Wayland Oil & Gas Company; completed, November 19, 1915; elevation 854′ L.

	Thickness. Feet.	Total. Feet.
Surface	13	13
Sand, dark	18	31
Shell, hard	11	42
Break	21	63
Sand, crevice	62	125
Slate	85	210
Sand	26	236
Slate, dark, and gravel cave	25	261
Sand, (water at 270′)	14	275
Shale, dark, and grit (water in grit at 320′)	53	328
Sand	18	346
Sand and shell (water in sand at 369′)	69	415
Flint ledge	3	418
Lime, hard	27	445
Shale and hard shells	44	489
Lime	25	514
Shale and shells	28	542
Sand	23	565
Shells and shale	26	591
Sand, very hard, Upper and Lower Nuttall, Harvey, and Guyandot	444	1035
Slate and hard lime shells	50	1085
Sand, Second Salt, Upper Raleigh (water at 1151′)	93	1178
Slate, black	10	1188
Sand, hard, white, Lower Raleigh	143	1331
Red rock and shells	224	1555
Slate, light, and shells	83	1638
Pencil Cave (bad)	12	1650
Sand, Maxton	23	1673
Pencil Cave	68	1741
Big Lime	180	1921
Sand, red (broken) Big Injun	44	1965
Sand and shells	35	2000
Sand, Weir, (light gas at 2003′)	46	2046
Slate and shells	54	2100
Sand, hard, Squaw	10	2110
Slate, black, and shells	150	2260
Shells, lime	45	2305
Slate	40	2345
Shale, brown	35	2380
Slate and shells	47	2427
Sand, Berea (smell of oil, 2431′-2438′)	33	2460
Slate and shells to bottom	162	2622

Abandoned as dry hole.

Casing record: 10″, 289′; 8¼″, 1300′; and 6⅝″, 1746′, all pulled out.

The above well starts about 320 feet below the Kanawha Black Flint.

A. D. Huntington No. 3—No. 20 on Map II.

Kanawha District, Kanawha County, on head of Hughes Creek, 1.9 miles above mouth of Shadrick Fork; authority, Geo. E. Miller; drilled by Wayland Oil & Gas Company; completed, October 7, 1916; elevation, 1115′ B.

	Thickness. Feet.	Total. Feet.
Surface	10	10
Quicksand and gravel	25	35
Sand, hard	10	45
Gravel	5	50
Sand, hard, white, Upper Winifrede (hole full of water)	85	135
Coal, Winifrede	3	138
Sand, hard, white, Lower Winifrede	47	185
Slate and shells	160	345
Sand, hard, white	92	437
Slate, black	48	485
Coal, No. 2 Gas	5	490
Slate, black	10	500
Sand, dark, hard	15	515
Slate, black	25	540
Lime, gritty	35	575
Sand, white, hard	45	620
Slate and lime shells	95	715
Sand, dark, hard	85	800
Lime, hard, gritty	75	875
Sand, First Salt, Dotson, and Upper and Lower Nuttall, (bad hole at 1075′ and 1110′)	267	1142
Coal, "Hughes Ferry", Iaeger	4	1146
Lime	9	1155
Sand, Second Salt, Harvey, Guyandot and Raleigh (water at 1310-1315′)	197	1352
Slate, black and lime shells	55	1407
Sand, Third Salt (**Lower Raleigh**) (show of gas at 1417′)	50	1457
Slate, white and lime shells	93	1550
Limy red rock	35	1585
Sand, white, hard	73	1658
Red rock and lime shells	109	1767
Sand, hard, white	24	1791
Lime	10	1801
Slate, light, and shells	35	1836
Red rock, hard	4	1840
Lime, very hard	14	1854
Slate, soft, black	4	1858
Lime, light, hard	12	1870
Sand, Maxton, hard and dark, (water at 1920′)	81	1951
Little Lime, hard and dark	36	1987
First pencil	3	1990
Lime	24	2014
Pencil Cave	7	2021
Big Lime (gas at 2155′-2160′)	202	2223

	Thickness Feet.	Total. Feet.
Sand, red, Big Injun	60	2283
Sand, Weir	108	2391
Slate and shells	289	2680
Shale, brown	25	2705
Shells, Berea Sand horizon	20	2725
Slate, white, and shells to bottom	275	3000

Well shut in in casing.

"Casing record: 10", 419' (pulled); 8¼", 1304' (pulled); 6⅝" 2021' (still in hole); well showed 4 to 5 million cubic feet of gas daily at first but soon died down to 430,000'. Gas is shut in."

The above well starts about 100 feet below the Kanawha Black Flint.

A. D. Huntington No. 5—No. 21 on Map II.

Kanawha District, Kanawha County, on north side of Kanawha River, on Slater Branch, 0.2 mile from mouth and 1 mile west of Montgomery; authority, Geo. E. Miller; drilled by Wayland Oil & Gas Company; completed, October 25, 1917; elevation, 669' L.

	Thickness. Feet.	Total. Feet.
Surface	93	93
Coal, Eagle (571' L.)	5	98
Unrecorded	287	385
Sand	70	455
Unrecorded	50	505
Sand, First Salt, (Lower Nuttall)	115	620
Coal, "Hughes Ferry", Iaeger	5	625
Slate and lime	31	656
Sand, Second Salt, Harvey, Guyandot and Raleigh, (2 bailers of water per hour)	267	923
Slate	41	964
Sand, Third Salt, (Lower Raleigh)	107	1071
Red rock	106	1177
Lime	29	1206
Red rock	101	1307
Lime and sand	40	1347
Slate	88	1435
Red rock	25	1460
Sand shells	13	1473
Sand, gray, Maxton, (5 bailers of water per hour at 1518')	49	1522
Slate	94	1616
Big Lime, (gas show at 1682')	196	1812
Sand, Big Injun, red	63	1875
Slate, black, and shells	41	1916
Sand, Weir, (gas at 1937'-1947')	49	1965
Slate and shells	305	2270
Shells, hard	6	2276
Shale, brown	14	2290
Sand, Berea, (gas at 2316'-2325')	40	2330
Slate, to bottom	11	2341

"Gas in Berea, 2316′ to 2325′; Weir gas 22-10 water, 2″ opening; decreased to 8-10 water as reached Berea. Berea gas 22-10 water when completed; after shot 20-10 mercury or 786,720 cubic feet per day.

"Casing record: 10″, 507′; 8¼″, 355′; 6⅝″, 1328′, Packer 2″x6⅝″ set at 575′ from bottom; to complete the string of 6⅝″, a 6⅝″x8¼″ swedge nipple was used and the 8¼″ and 6⅝″, shown in the record, were used together as one string. Reduced hole from 10″ to 8¼″ at 1087′; no 8¼″ used in 10″ hole."

The above well starts 24 feet below an opening in the No. 2 Gas Coal bed.

A. D. Huntington No. 2—No. 22 on Map II.

Kanawha District, Kanawha County, on north side of Kanawha River, 0.5 mile below mouth of Slater Fork; authority, George E. Miller; drilled by Wayland Oil & Gas Company; completed, January 12, 1916; elevation, 704′ L.

	Thickness. Feet.	Total. Feet.
Surface	18	18
Lime, (water at 55′)	42	60
Coal, Powellton	4	64
Sand, gray, Eagle	76	140
Coal, Eagle	3	143
Sand, white	15	158
Shale, black	3	161
Slate and shales	89	250
Sand, white	55	305
Slate and shells	81	386
Flint	5	391
Slate and shells	66	457
Sand, white	90	547
Slate and shells	15	562
Sand, white, hard	148	710
Slate, black	12	722
Sand, white, hard (hole full of water at 755′)	273	995
Slate and shells	50	1045
Sand, Second Salt	85	1130
Slate, black	18	1148
Sand, white	54	1202
Red rock	143	1345
Sand, white	61	1406
Red rock	20	1426
Slate and lime shells	89	1515
Sand, Maxton	65	1580
Lime	35	1615
Pencil Cave	8	1623
Little Lime	19	1642
Pencil Cave	7	1649
Big Lime	143	1792
Sand, Keener, (gas at 1800′-1812′; 20-10 water, 2″ pipe)	23	1815

	Thickness Feet.	Total. Feet.
Sand, Big Injun, red	85	1900
Slate, black	38	1938
Sand, Weir, (gas at 1970′-1975′)	60	1998
Slate and shells	312	2310
Shale, brown	19	2329
Sand, Berea (gas, 6-10 water, 2″ pipe, at 2340′)	13	2342
Shell, hard	3	2345
Slate, hard, and shells, to bottom	19	2364

"Big Injun gas, 260,000′ daily; Berea gas 115,000′ daily.

"Casing record, 16′ wooden conductor left in hole; 10″, 344′, left in hole; 8¼″, 800″, left in hole; 6⅝″, 1649′, left in hole."

A. D. Huntington No. 4—No. 23 on Map II.

Cabin Creek District, Kanawha County, on north side of Kanawha River, 0.2 mile below London; authority, Geo. E. Miller, drilled by Wayland Oil & Gas Company; completed, May 11, 1917; elevation, 654′ L.

	Thickness. Feet.	Total. Feet.
Quicksand, (hole full of water at 30′; wet until 8¼″ casing was put in)	58	58
Sand	50	108
Unrecorded	6	114
Lime or close sand	30	144
Unrecorded	10	154
Sand	45	199
Unrecorded	15	214
Sand, white	36	250
Unrecorded	10	260
Sand, white	45	305
Unrecorded	6	311
Lime	22	333
Unrecorded	15	348
Sand, white, Upper and Lower Nuttall, Harvey and Guyandot	484	832
Break of slate, some coal, Sewell ?	12	844
Sand, Upper and Lower Raleigh	220	1064
Red rock and shells	98	1162
Sand, Maxton (gas at 1165′)	60	1222
Red rock and shells	143	1365
Maxton ?	55	1420
Lime with grit	55	1475
Unrecorded	12	1487
Lime, black or crystallized	23	1510
Big Lime, yellow (gas at 1673′)	190	1700
Big Injun Sand	50	1750
Unrecorded	48	1798
Sand, Weir, (gas at 1826′)	54	1852
Unrecorded	312	2164
Shale, brown	12	2176
Sand, Berea, very hard and glassy	42	2218
Unrecorded to bottom	47	2265

“Big Lime gas pocket exhausted quickly and well abondoned as dry hole.

“Casing record: 13″, 32′, left in well; 10″, 413′, pulled; 8¼″, 1000 80′ left in well; 6⅝″, 1568′, 368′ left in well.”

B. H. Early No. 1 Well Record—No. 31 on Map II.

In Kanawha County on east bank of Morris Creek, west edge of Montgomery, 200′ south of main line of C. & O. Railroad; drilled by Ira G. Sayres, who with George E. Miller is authority for log; elevation, 622′ L.; started rigging up January 4, 1918; started spudding January 8, 1918, and completed March 11, 1918.

	Thickness. Feet.	Total. Feet.
Quicksand and gravel (water at 40′)	45	45
Slate	20	65
Lime	75	140
Sand	30	170
Slate	47	217
Lime	4	221
Coal, Gilbert	3	224
Slate, shells and sand, (hole full of water at 275′)	146	370
Coal, Lower Douglas	3	373
Slate	27	400
Gritty lime	30	430
Black slate	5	435
Sand, Lower Nuttall	93	528
Slate	37	565
Salt Sand, Harvey and Guyandot	175	740
Slate	4	744
Sand	48	792
Coal, Sewell ?	3	795
Sand, Upper Raleigh	75	870
Slate and shells	50	920
Coal, Little Raleigh	6	926
Slate and shells	31	957
Sand, Pineville	43	1000
Slate	7	1007
Lime	11	1018
Red rock	5	1023
Lime	32	1055
Slate	10	1065
Red rock	85	1150
Lime	35	1185
Red rock	40	1225
Gritty lime	33	1258
Red rock and shells	112	1370
Slate and shells	40	1410
Red rock and shells	23	1433
Maxton Sand (water to drill at 1460′)	37	1470
Slate	20	1490
Little Lime	36	1526
White slate	7	1533
Gray lime	7	1540
Pencil Cave	17	1557

	Thickness Feet.	Total. Feet.
Big Lime (gas at 1657', blew out)	158	1715
Keener Sand	60	1775
Big Injun Sand	65	1840
Slate, shells, and lime	42	1882
Weir Sand (gas pay at 1898'-1903')	38	1920
Slate and shells	310	2230
Brown shale	25	2255
Berea, shells	45	2300
Slate, to bottom	10	2310

"Tubed March 17, 2" tubing; anchor packer used 433'; anchor packer set at 1877'; perforation from 1897' to 1919'.

"Casing record: Wood conductor 15½'; 12½" casing, 20' 6"; 10" casing, 234'; 8" casing, pulled, 1108'; 6⅝" casing, 1577'."

The above well starts 130 feet below the No. 2 Gas Coal and produces about ½ million feet of gas daily from the Weir Sand.

The two following records are from wells on Upper Creek, Kanawha County, both of which are gassers from the Weir Sand, never having been drilled down into the Berea:

Keystone Coal Company No. 1—No. 29 on Map II.

Cabin Creek District, Kanawha County; on east side of Upper Creek, 1.1 miles from mouth; drilled by United Fuel Gas Company, authority for record; completed about 1916; elevation, 950' L.

	Thickness. Feet.	Total. Feet.
Slate and shells	100	100
Sand	40	140
Slate and shells	45	185
Slate, black	15	200
Slate and lime	155	355
Coal, Eagle (591' L.)	4	359
Shale and shells	111	470
Sand (small show of gas at 527')	65	535
Slate	15	550
Sand	30	580
Slate	10	590
Sand	50	640
Slate	20	660
Lime	20	680
Slate	20	700
Sand, Upper Nuttall, (show of gas at 752' and 1 bailer water at 710')	90	790
Slate, black	10	800
Sand, Lower Nuttall	80	880
Slate, black	10	890
Sand, Harvey, Guyandot and Raleigh	335	1225
Slate and shells	110	1335

	Thickness Feet.	Total Feet
Sand (4 bailers of salt water at 1350′)	25	1360
Lime, black	30	1390
Slate, black	20	1410
Red rock	65	1475
Slate	35	1510
Red rock	65	1575
Slate	20	1595
Sand, Maxton	80	1675
Red rock	20	1695
Slate and shells	40	1735
Red rock	30	1765
Slate	105	1870
Lime	5	1875
Pencil Cave	20	1895
Big Lime	235	2130
Sand, Big Injun	45	2175
Slate	45	2220
Sand, Weir, (gas at 2230′-2240′ and 2253′-2263′)	53	2273
Slate to bottom	28	2301

Initial gas volume, 2,974,000 cubic feet daily from Weir Sand.

John Q. Dickinson No. 1—No. 30 on Map II.

Cabin Creek District, Kanawha County; on west side of Upper Creek, 1.2 miles from mouth; drilled by South Penn Oil Company, authority for record; completed, June, 1917; elevation, 937′ L.

	Thickness. Feet.	Total. Feet.
Unrecorded	1933	1933
Big Lime	180	2113
Big Injun	48	2161
Slate and shale	50	2211
Sand, Weir, (gas at 2218′-2236′ and 2236′-2246′; gauged 7-10 water in 6⅝″ or 1,301,850 cu. ft. daily)	47	2258

The two foregoing wells—Nos. 29 and 30 on Map II—are located at a lower structural level than the Berea Sand gassers—Nos. 21, 22, and 32 on Map II—or at practically the same structural level as the richest portion of the Cabin Creek oil pool. The completion of either of these down into the Berea offers a favorable chance for oil in the latter sand.

The **A. D. Huntington No. 6 Well—No. 24 on Map II**—located in Kanawha County on the north side of the Kanawha & Michigan Railroad, opposite Handley, 3000 feet northwest of well No. 22 on Map II, is a location made in March, 1918, by the Wayland Oil & Gas Company.

OIL AND GAS PROSPECTS IN FAYETTEVILLE DISTRICT.

No test wells for oil or gas had been drilled in Fayetteville District and it is problematical whether or not oil and gas will ever be found in it in paying quantities. The log of the Rowland Land Company No. 1 Well—No. 18 on Map II—the details of which are published on pages 354-5, should give a fair idea of the intervals below the No. 2 Gas and Sewell Coal beds that the usual oil and gas zones of the West Virginia fields should lie. Practically the entire area of the District lies in that portion of the County carrying coal beds with a high fixed carbon content—65 to 75 per cent.—a feature, as mentioned heretofore, that is by no means a favorable indication that oil is present in paying quantities. However, there are two marked interruptions of the general northwest dip of the surface strata. The first of these is shown by the wide divergence of the 1300- and 1400-foot Sewell Coal contours southwestward from Parral (Summerlee) to Plumorchard Creek, indicating that there must exist a marked structural terrace for the underlying oil sands. From a purely structural standpoint, this attitude of the rocks is ideal in the northwestern portion of the State for the accumulation of a rich oil pool. The top of the Big Lime (Greenbrier Limestone) probably belongs here 1200 to 1300 feet below the Sewell Coal.

The other marked interruption of dip, mentioned above, is along the southeast border of the District, southwestward from Alaska along the west side of New River to the Raleigh County Line. Wells Nos. 17 and 17A on Map II, described on page 356, are located on this structural form along the east bank of New River in Quinnimont District, and the remarks in connection with these wells and other unfavorable conditions in the latter area, apply with equal force for that portion of this structural interruption lying within Fayetteville District.

Away from the two structural forms last mentioned, any attempts to find either oil or gas in paying quantities in the District in question would be accompanied by still greater hazard.

CHAPTER XI.

COAL AND COKE.

A brief description has already been given in Chapters V to VIII, inclusive, of all the coal beds, minable and unminable, that were observed in Fayette County. In this Chapter there will be given the statistics of coal production; the detailed logs of a number of coal test borings; and numerous special sections of the minable coals, obtained at crop exposures, country banks, prospect openings and commercial mines along with etchings showing the approximate minable area of the several seams, as also tables showing their available tonnage. At the end of this Chapter there are four tables of analyses—Nos. 1, 2, 3, and 4—the first two representing coal and coke results, respectively, determined in the laboratory of the W. Va. Geological Survey, and the third, compiled from published results of the U. S. Geological Survey and the U. S. Bureau of Mines, and the fourth, of coals analyzed for the Government during the fiscal years 1908-1915.

STATISTICS OF COAL PRODUCTION.

Coal mining operations on a commercial basis have been prosecuted extensively in Fayette since the completion of the Chesapeake & Ohio Railroad in 1873, ranking this County next to McDowell in total tonnage produced in the State. The following table, with the coal beds arranged in descending order, shows the relative importance of the seams when considered from the standpoint of the number of mining operations that have been opened on each in this County:

Number of Mines by Coal Beds.

Name of Coal.	Number of Mines.
Allegheny Series (10 Mines)	
Middle Kittanning ("North Coalburg")	1
No. 5 Block—Lower Kittanning	9
Kanawha Group, Pottsville Series (90 Mines)	
Coalburg	5
Chilton	1
Peerless and No. 2 Gas	45
Powellton	13
Eagle	24
Little Eagle	1
Douglas	1
New River Group, Pottsville Series (113 Mines)	
Sewell	82
Fire Creek	31
Pocahontas Group, Pottsville Series (1 Mine)	
No. 6 Pocahontas	1
Total for County	214

With the exception of less than 10 shaft mines to the Sewell bed, all the above openings are either by drift or slope, owing to the wide area of the several beds cropping above drainage.

The following tables on coal production are compiled from the Annual Report of Hon. Earl A. Henry, Chief of the Department of Mines, for the year ending June 30, 1916:

Coal Production of Fayette County from 1888 to June 30, 1916.

Year.	Tons of 2240 lbs.	Year.	Tons of 2240 lbs.
1888	1,522,430	1903	4,075,324
1889	989,276	1904	5,650,217
1890	1,302,355	1905	6,738,343
1891	1,737,617	1906	7,625,839
1892	1,564,579	1907	7,277,297
1893	2,350,250	1908	6,851,271
1894	1,195,102	1909	7,597,747
1895	2,162,090	1910	9,389,578
1896	3,253,547	1911	9,019,395
1897	2,993,061	1912	8,812,058
1898	3,960,266	1913	9,079,857
1899	4,446,469	1914	8,686,988
1900	4,547,002	1915	7,881,872
1901	5,375,702	1916	10,367,505
1902	5,724,882		
		Total	152,177,919

Statistics are not available as to the amount mined previous to 1888, but probably not more than 20,000,000 long tons had been taken out. Probably 25,000,000 long tons will have been mined for the two years ending June 30, 1918. Adding these results to the total in the above table gives a total in round numbers of 197,000,000 long tons or 220,000,000 short tons.

Coal and Coke Production by Mines for Fayette County for the Year Ending June 30, 1916.

NAME OF COMPANY	NAME OF MINE	Production of Coal (Tons of 2240 lbs.)			Distribution of Coal (Tons of 2240 lbs.)				Production of Coke (Tons of 2000 lbs.)		
		First Six Months.	Second Six Months.	Total Coal Produced During Year.	Used in Operation of Mine.	Furnished Local Trade and Tenants.	Used in Coke Ovens.	Quantity Shipped from Mines.	First Six Months.	Second Six Months.	Total Coke Production for Year.
Aileen Coal Co.	Old Keeney	18,906	16,033	34,939		150		34,789			
Ajax Coal Co.	Ajax	12,722	15,234	27,956	630			27,326			
Babcock Coal & Coke Co.	Nos. 3 and 4	28,201	36,627	64,828	1,972	898	34,377	27,581	12,327	20,731	33,058
Ballinger Coal Co.	Ballinger No. 1	27,689	26,062	53,751		728		53,023			
Beechwood Coal & Coke Co.	No. 1	25,827	22,926	48,753	500	600		47,653			
Beechwood Coal & Coke Co.	No. 2	20,593	19,318	39,911	660	300		38,951			
Beury Bros. Coal & Coke Co.	Echo	17,703	30,944	48,647	200	480		47,967			
Big Bend Coal Co.	Big Bend	8,463	6,484	14,947	355	190		14.402			
Blume Coal & Coke Co.	Blume	28,237	27,007	55,244	1,400	440		53 404			
Boomer Coal & Coke Co.	No. 2 North	160,456	102,429	262,885	221	28		262,636			
Boomer Coal & Coke Co.	No. 2 South	112,569	82,052	194,621	7,434	64		187,123			
Boomer Coal & Coke Co.	No. 4	117,399	108,834	226,233	67	49		226,117			
Boomer Coal & Coke Co.	No. 5	94,055	83,711	177,766	46	3,507		174,213			
Branch Coal & Coke Co.	Elverton	41,523	45,299	86,822	600			86,222			
Brown Coal Co.	Brown	56,986	30,147	87,133	600	500		86,033			
Cannelton Coal & Coke Co.	No. 2 North and South	293,163	292,251	585,414	2 980			582,434			
Cannelton Coal & Coke Co.	No. 4	71,460	32,305	103,765				103 765			
Cannelton Coal & Coke Co.	No. 5		4,760	4,760				4,760			
Christian Colliery Co.	Eagle No. 1	52,800	48,500	101,300	2,400	800		98,100			
Christian Colliery Co.	Powellton	12,400	10,300	22,700				22,700			
Collins Colliery Co.	Collins Nos. 1, 2, 3, 4	45,376	49,929	95,305	583			94,722			
Columbus Iron & Steel Co., The	No. 1	99,148	114,342	213,490	5,780	1,547	61,497	144,666	18,524	19,722	38,246
Deitz Colliery Co.	Deitz	15,978	23.838	39,816	500	500		38,816			
DeWitt Fuel Co.	DeWitt		3,567	3,567				3,567			
Dunn Loop Coal & Coke Co.	Dunn Loop Nos. 2, 3, 4, 5, 6	134,791	114,267	249,058		955		248,103			
Eagle Coal Co.	Eagle	3,000	6,050	9,050		700		8,350			
Elmo Mining Co., The	Elmo	12,705	12.455	25,160	1,200	310		23,650			
Ephraim Creek Coal & Coke Co.	Buffalo and Slater	82,982	78,709	161,691	2,578	2,292		156,821			
Export Coal Co.	Export	14,935	14,935	29,870	990	430		28,450			
Fayette Smokeless Coal Co.	Fayette	1,303	4,697	6,000	500	60		5,440			
Fire Creek Coal & Coke Co.	Fire Creek	20,158	22,315	42,473	800	400	20,900	20,373	5,788	9,150	14,938
Fort Defiance Coal & Coke Co.	Fort Defiance	20,502	23,892	44 394	1,909	158		42,327			
Gauley Mountain Coal Co., The	Buck Run	23,720	37,129	60,849	1,800			59,049			
Gauley Mountain Coal Co., The	Scotia and Turkey Creek	72,329	82,217	154,546	6,843		77,586	70,117	24,522	25,177	49,699
Gaymont Coal Co.	Gaymont	1,570	1.797	3,367				3,367			
Greenwood Coal Co.	Greenwood	67,671	52,887	120,558	221	2,489		117,848			
Harvey Coal & Coke Co.	Harvey	113,787	114,193	227,980		14,238		213,742			

Coal and Coke Production by Mines for Fayette County for the Year Ending June 30, 1916.—(Continued).

NAME OF COMPANY	NAME OF MINE	Production of Coal (Tons of 2240 lbs.) First Six Months.	Production of Coal (Tons of 2240 lbs.) Second Six Months.	Production of Coal (Tons of 2240 lbs.) Total Coal Produced During Year.	Distribution of Coal (Tons of 2240 lbs.) Used in Operation of Mine.	Distribution of Coal (Tons of 2240 lbs.) Furnished Local Trade and Tenants.	Distribution of Coal (Tons of 2240 lbs.) Used in Coke Ovens.	Distribution of Coal (Tons of 2240 lbs.) Quantity Shipped from Mines.	Production of Coke (Tons of 2000 lbs.) First Six Months.	Production of Coke (Tons of 2000 lbs.) Second Six Months.	Production of Coke (Tons of 2000 lbs.) Total Coke Production for Year.
Hemlock Hollow Coal & Coke Co.	Hemlock	31,478	25,084	56,562		5,638		50,924			
Hinsdale Coal Co., The	Dun Glen	6,276	5,220	11,496		100		11,396			
Kanawha Rail & River Coal Co.	Diamond		1,653	1,653				1,653			
Kanawha Rail & River Coal Co.	Edgewater No. 2		18,132	18,132				18,132			
Keeney's Creek Colliery Co.	Rothe	26,485	25,758	52,243	720	600		50,923			
Keeney's Creek Colliery Co.	[illegible]	33,400	28,781	62,181		1,200		60,981			
Laura Mining Co.	Laura	10,839	6,276	17,115	115	231		16,739			
Laurel Creek Coal Co.	Laurel	30,421	24,266	54,687		600		54,087			
Long Branch Coal Co.	Long Branch No. 2	54,760	60,509	115,269	422	1,000		113,847			
Lookout Coal & Coke Co.	Lookout	17,516	17,324	34,840		844		33,996			
Loup Creek Colliery Co.	Loup Creek No. 2 and Eagle No. 1	127,784	124,674	252,458	1,192	2,016		249,250			
Low Moor Iron Company of Va., The	Low Moor No. 1	60,655	61,312	121,967	6,000	1,200	35,000	79,767		23,000	23,000
Lynchburg Colliery Co.	Lynchburg	18,022	29,784	47,806	500	500		46,806			
Macdonald Colliery Co.	Macdonald	29,477	28,977	58,454		1,308		56,846			
M. B. Coal & Coke Co.	Columbia No. 5	17,864	13,518	31,382		2,800		28,582			
M. B. Coal & Coke Co.	Elkridge No. 1	31,198	28,388	59,586		1,900		57,686			
M. B. Coal & Coke Co.	Elkridge No. 2	49,751	38,561	88,312	1,200	2,400		84,712			
M. B. Coal & Coke Co.	Kimberly No. 3	3,916	10,905	14,821	2,300	1,200		11,321			
Meadow Fork Coal Co.	Meadow Fork	11,117	12,076	23,193	300	300		22,593			
Michigan Coal Co.	Michigan	8,733	14,775	23,508	259	356		22,893			
Midvale Colliery Co.	Midvale	46,330	51,035	97,365		600		96,765			
Milburn Coal Co.	Milburn No. 1	84,882	105,090	189,972	261	698		189,013			
Mill Creek Colliery Co.	Mill Creek	7,901	9,059	16,960				16,960			
Mount Carbon Co., Ltd., The	Plum		3,248	3,248	335			2,913			
Mount Carbon Co., Ltd., The	Vulcan	42,815	55,474	98,289	2,920	1,017	56,534	37,818	13,166	22,673	35,839
Mount Hope Coal & Coke Co.	Bain	27,400	20,600	48,000	2,000	3,600		42,400			
McKell Coal & Coke Co.	Derryhale	23,570	31,200	54,770	2,100	480		52,190			
McKell Coal & Coke Co.	Kilsyth Nos. 1 and 2	69,670	86,694	156,364	7,515	1,201		147,648			
Newlyn Coal Co.	Newlyn	11,284	12,125	23,409		300		23,109			
New River Collieries Co., The	Sun Nos. 1, 2, 3	271,805	199,347	471,152	8,400	2,400		460,352			
New River Collieries Co., The	Layland Nos. 1, 2, 3, 4	143,781	125,744	269,525	7,801	1,325		260,399			
New River & Poca. Cons. Coal Co.	No. 2	62,496	63,851	126,347	8,416			117,931			
New River & Poca. Cons. Coal Co.	No. 3	73,854	99,487	173,341				173,341			
New River & Poca. Cons. Coal Co.	No. 4	95,474	100,180	195,654		4,942		190,712			
New River & Poca. Cons. Coal Co.	Minden No. 5	72,865	61,278	134,143		1,623		132,520			
New River & Poca. Cons. Coal Co.	Westwood	28,213	27,088	55,301	445	696		54,160			
Nichol Colliery Co.	Nichol	23,679	34,591	58,270	2,137	784		55,349			

Coal and Coke Production by Mines for Fayette County for the Year Ending June 30, 1916.—(Concluded).

NAME OF COMPANY	NAME OF MINE	Production of Coal (Tons of 2240 lbs.)			Distribution of Coal (Tons of 2240 lbs.)				Production of Coke (Tons of 2000 lbs.)		
		First Six Months.	Second Six Months.	Total Coal Produced During Year.	Used in Operation of Mine.	Furnished Local Trade and Tenants.	Used in Coke Ovens.	Quantity Shipped from Mines.	First Six Months.	Second Six Months.	Total Coke Production for Year.
Nuttallburg Smokeless Fuel Co.	Nuttall	29,376	29,999	59,375	216	1,252	11,688	46,219	778	7,207	7,985
Prudence Coal Co.	Lynch 1, 2, 3, and Jones Nos. 2 and 3	67,953	80,671	148,624	....	1 484	....	147,140	....	....	....
Quinnimont Coal Co.	Big "Q" and Lick Branch	34,744	33,952	68,696	300	900	....	67,496	....	....	....
Ridgeview Coal Co.	Ridgeview	2,756	....	2,756	100	120	....	2,536	....	....	....
River Valley Colliery Co.	Bachman	15,120	10,464	25,584	500	144	....	24 940	....	....	....
Rock Lick Coal Co.	Concho Nos. 1 and 4	38,674	40,991	79,665	....	1,096	....	78,569	....	....	....
Rock Lick Coal Co.	Erskine No. 2	9,113	15,743	24,856	....	100	....	24,756	....	....	....
Rothwell Coal Co.	Dubree	13,366	11,343	24,709	200	600	....	23,909	....	....	....
Rothwell Coal Co.	Rosedale	1,270	2 580	3,850	....	....	....	3,850	....	....	....
Scotia Coal & Coke Co.	Brooklyn	33,372	38,981	72 353	122	500	4,973	66,758	....	2,960	2,960
Scotia Coal & Coke Co.	Once More	No tonnage reported									
Scotia Coal & Coke Co.	Red Ash	11,856	3,059	14 915	....	200	....	14,715	....	....	....
Scotia Coal & Coke Co.	Rush Run	31,572	30,637	62,209	872	600	....	60,737	....	....	....
Sewell Colliery Co.	Sugar Camp	20,759	19,134	39,893	720	600	....	38,573	....	....	....
Signal Knob Coal Co.	Signal Knob	11,340	14,470	25,810	....	....	....	25,810	....	....	....
Solvay Collieries Co.	Nos. 1 "A", 1 "B", 3, 4, 5, 8	275,166	266,277	541 443	3,600	2,396	....	535,447	....	....	....
Solvay Collieries Co.	Nos 1 and 2	58,565	73,214	131,779	2,600	1,205	....	127,974	....	....	....
South Side Company	South Side	39,126	46,394	85,520	621	1,771	....	83,128	....	....	....
Star Coal & Coke Co., The	Star Nos. 1 and 2	63,664	57,689	121,353	4,096	1 428	....	115,829	....	....	....
St. Clair Collieries Co.	Archer	18,900	18,090	36,990	....	220	....	36,770	....	....	....
St. Clair Collieries Co.	St. Clair	42,000	26,700	68,700	....	50	....	68,650	....	....	....
Stone Cliff Coal & Coke Co.	Stone Cliff	18,880	23,145	42,025	1,070	18,088	....	22 867	....	....	....
Stuart Colliery Co.	Lochgelly	53,823	70,890	124,713	1,270	3,915	....	119,528	....	....	....
Stuart Colliery Co.	Summerlee	51,627	70,593	122.220	4,830	1,245	....	116,145	....	....	....
Sugar Creek Coal & Coke Co.	Sugar Creek Nos. 1 and 2	33,380	42,280	75,660	824	1,077	....	73,759	....	....	....
Sunday Creek Coal Co.	No. 111	94,642	93 550	188,192	2,581	827	....	184,784	....	....	....
Sunday Creek Coal Co.	No. 112	30,960	74,430	105,390	4,023	1,172	....	100.195	....	....	....
Sunday Creek Coal Co.	No. 114	133,848	106,880	240,728	5,467	1,841	15,464	217,956	....	10,103	10,103
Sunday Creek Coal Co.	No. 116	....	32,177	32,177	845	330	10,726	20,276	....	7,651	7,651
Turkey Knob Coal Co.	Turkey Knob Nos. 1 and 2	85 677	76,832	162,509	....	2,500	39,459	120,550	13,439	16,156	29,595
White Oak Fuel Co.	Oakwood	57,736	69,222	126,958	3,675	1,584	....	121,699	....	....	....
White Oak Fuel Co.	Scarbro	108,785	99,894	208,679	2,576	....	....	206,103	....	....	....
White Oak Fuel Co.	Whipple	48,931	64,917	113,848	1,023	1,467	....	111,358	....	....	....
Willis Branch Coal Co.	Willis Branch	18,153	25,869	44,022	208	295	....	43,519	....	....	....
W. R. Johnson Coal Co.	Crescent	....	6,155	6,155	....	....	....	6,155	....	....	....
W. R. Johnson Coal Co.	Oakland	41,981	46,144	88,125	205	460	....	87,460	....	....	....
Totals		5,186,683	5,180,822	10 367,505	141,681	126,169	368,174	9,731,481	88,544	164,530	253,074

Order of Production of Coal by Counties, 1897 to 1916.

COUNTY	1897	1898	1899	1900	1901	1902	1903	1904	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916
Barbour	19	19	17	18	12	12	10	9	11	11	11	12	12	12	12	12	12	12	13	13
Boone	....	....	....	....	....	....	....	....	....	....	....	....	33	27	26	21	21	20	16	15
Braxton	....	....	....	....	....	....	....	....	....	....	26	23	23	23	23	22	23	23	23	24
Brooke	17	18	18	20	20	20	23	22	17	17	16	15	15	18	16	15	17	17	15	19
Clay	....	....	....	....	....	....	....	25	23	23	24	27	30	30	25	24	22	22	20	22
Fayette	1	1	1	1	1	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2
Gilmer	....	....	....	....	....	....	....	....	....	....	32	32	31	31	31	26	26	28	25	28
Grant	....	....	....	....	....	....	22	18	19	19	20	20	20	21	21	23	24	24	24	26
Greenbrier	....	....	....	....	....	....	....	....	....	....	28	28	29	32	30	27	32	33	32	32
Hancock	18	20	20	21	21	21	20	21	24	24	23	25	26	24	27	....	....	....	....	....
Harrison	9	9	8	7	5	5	4	5	5	5	5	5	5	5	5	6	4	6	7	7
Kanawha	4	4	4	4	4	4	5	3	4	3	3	3	3	3	3	3	7	5	5	6
Lewis	....	....	....	....	....	....	....	....	....	....	31	31	32	33	33	30	31	32	33	33
Lincoln	....	....	....	....	....	23	21	23	27	26	30	30	25	28	28	....	30	29	31	30
Logan	....	....	....	....	....	....	....	....	20	18	12	9	7	8	7	7	6	4	3	3
Marion	3	3	3	3	3	3	3	4	3	4	4	4	4	4	4	4	3	3	4	4
Marshall	11	12	12	12	13	16	13	14	14	15	15	18	19	16	18	16	15	14	12	14
Mason	14	14	15	16	18	19	19	20	22	21	22	22	22	22	22	25	25	25	26	29
McDowell	2	2	2	2	2	2	1	2	1	1	1	1	1	1	1	1	1	1	1	1
Mercer	5	5	5	6	6	6	6	6	6	6	6	6	6	7	8	8	8	8	8	8
Mineral	7	7	6	8	8	9	11	11	12	13	14	13	11	13	15	17	16	16	17	18
Mingo	8	8	9	9	9	8	8	7	7	7	7	7	9	9	9	9	9	9	9	9
Monongalia	20	17	19	17	19	18	17	17	18	20	19	19	18	19	19	19	19	21	22	21
Nicholas	....	....	....	....	....	22	24	24	25	25	25	26	27	26	24	29	27	26	27	25
Ohio	15	15	14	15	16	17	18	19	21	22	21	21	21	20	20	20	20	19	19	17
Preston	13	11	10	10	10	10	9	10	10	9	9	11	13	11	11	11	11	10	11	11
Putnam	12	13	13	13	15	15	16	15	15	14	18	16	17	17	17	18	18	18	21	20
Raleigh	16	16	16	19	17	13	15	12	9	10	8	8	8	6	6	5	5	7	6	5
Randolph	....	....	....	14	14	14	12	13	13	12	13	14	14	14	13	14	14	15	18	16
Taylor	10	10	11	11	11	11	14	16	16	16	17	17	16	15	14	13	13	13	14	12
Tucker	6	6	7	5	7	7	7	8	8	8	10	10	10	10	10	10	10	11	10	10
Upshur	....	....	....	....	....	....	....	....	....	28	27	24	21	25	29	31	29	27	28	27
Wayne	....	....	....	....	....	....	....	....	26	27	29	29	28	29	32	28	28	30	30	31
Wyoming	....	....	....	....	....	....	....	....	....	....	....	33	34	34	....	....	33	31	29	23

Production of Coke by Counties for the Year Ending June 30, 1916.

County.	Number of Coke Plants.	Total Tons of Coal Used in Ovens (Tons of 2240 lbs.)	Total Tons of Coke Produced (Tons of 2000 lbs.)	Percentage of Yield.	Total Number of Coke Ovens Reported.	Total Number of Ovens Reported Not in Use	Average Number of Coke Ovens Operated During the Year.		Average Number of Days Ovens Operated.	Number of Men Employed.
							In County.	Per Plant.		
Barbour	3	48,802	36,984	75.78	161	68	93	47	211	16
Fayette	17	368,174	253,074	68.74	2,380	1,340	1,040	94	199	341
Harrison	5	48,647	32,282	66.15	200	112	88	44	268	32
Marion	11	132,011	88,441	67.00	794	529	265	88	213	54
McDowell	41	1,546,367	996,400	57,90	9.730	6,269	3,461	112	233	1,328
Mercer	10	236,524	155 198	65,62	1,681	1,119	562	80	278	179
Monongalia	3	138,983	92,792	66.76	216	83	133	67	256	44
Nicholas	1	....	....	....	50	50	....	....	....	....
Preston	7	196,547	142,219	72.39	995	601	394	131	210	86
Randolph	2	145,994	114,415	78.37	335	104	231	116	273	58
Taylor	1	23,503	14,101	60.00	30	4	26	26	316	9
Tucker	1	19,647	13,097	66.66	135	99	36	36	156	12
Upshur	1	20,124	18,629	92.03	16	....	16	16	209	10
Totals	103	2,925,323	1,957,632	69.78	16,723	10,378	6 345	71	236	2,169

Order of Production of Coke by Counties, 1897 to 1916.

COUNTIES.	1897	1898	1899	1900	1901	1902	1903	1904	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916
Barbour	....	11	9	11	8	11	11	9	10	9	9	9	9	9	9	11	9	9	9	8
Fayette	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	3	2
Harrison	....	10	10	9	10	10	7	11	....	10	10	12	11	12	....	....	11	10	8	9
Kanawha	6	7	8	7	6	7	10	10	9	11	11	10	....	10	10	....	....	....	....	....
Logan	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	14	....	....
Marion	4	5	4	3	5	4	4	5	6	6	6	7	8	8	8	6	6	7	6	7
McDowell	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Mercer	5	4	3	5	4	5	5	4	3	3	3	3	3	3	3	4	3	3	2	3
Monongalia	9	9	11	8	11	8	9	8	8	8	8	8	6	7	5	7	7	6	7	6
Nicholas	....	....	....	....	....	....	....	....	....	....	....	....	....	13	12	10	13	13	13	....
Preston	7	6	6	6	9	9	8	7	7	7	7	5	4	4	4	3	4	4	5	4
Raleigh	8	8	7	10	....	....	....	....	....	....	....	13	....	....	....	....	....	....	....	....
Randolph	....	....	....	12	7	6	6	6	5	5	5	6	5	5	6	5	5	5	4	5
Taylor	....	....	....	....	....	....	....	....	....	....	13	....	10	11	11	9	10	8	10	11
Tucker	3	3	5	4	3	3	3	3	4	4	4	4	7	6	7	8	8	11	11	12
Upshur	....	....	....	....	....	....	....	....	....	....	12	11	....	....	....	....	12	12	12	10

Production of Coke by Years, in Fayette County.

Year	Short Tons (2000 lbs.)
1897	329,089
1898	394,052
1899	454,999
1900	481,699
1901	442,411
1902	515,398
1903	437,090
1904	434,919
1905	430,163
1906	614,428
1907	615,577
1908	415,425
1909	325,154
1910	713,540
1911	474,481
1912	370,517
1913	568,418
1914	406,455
1915	128,770
1916	253,074
Total	8,805,659

Production of Coke by Companies in Fayette County for Year Ending June 30, 1916.

Name of Company.	Name of Mine	Tons of Coal Used In Ovens (Tons of 2240 lbs.)	Tons of Coke Produced (Tons of 2000 lbs.)	Number of Coke Ovens Reported.	Average Number of Ovens Used Per Plant.	Average Number Days Ovens Were Operated	Number of Ovens Not in Use.
Babcock Coal & Coke Company	Nos. 3 and 4	34,377	33,058	192	192	300	...
Branch Coal & Coke Company	Elverton	......	......	58	...	...	58
Columbus Iron & Steel Company, The	No. 1	61,497	38,246	84	84	287	...
Fire Creek Coal & Coke Company	Fire Creek	20,900	14,938	96	63	287	33
Gauley Mountain Coal Company, The	Scotia and Turkey Creek	77,586	19,699	152	120	300	32
Loup Creek Colliery Company	Loup Creek No. 2 and Eagle No. 1	......	......	505	...	...	505
Low Moor Iron Company of Virginia, The	Kay Moor No. 1	35,000	23,000	127	111	125	16
Mount Carbon Company, Limited, The	Vulcan	56,504	35,839	202	123	313	79
Nuttallburg Smokeless Fuel Company	Nuttall	11,688	7,985	65	46	110	19
Scotia Coal & Coke Company	Brooklyn	4,973	2,960	63	40	40	23
Scotia Coal & Coke Company	Rush Run	......	......	93	...	...	93
Stone Cliff Coal & Coke Company	Stone Cliff	......	......	60	...	..	60
Sunday Creek Coal Company	No. 111	......	......	102	...	...	102
Sunday Creek Coal Company	No. 112	......	......	200	...	...	200
Sunday Creek Coal Company	No. 114	15,464	10,103	115	110	63	5
Sunday Creek Coal Company	No. 116	10,726	7,651	166	76	57	90
Turkey Knob Coal Company	Turkey Knob Nos. 1 and 2	39,459	29,595	100	75	279	25
Totals		368,174	253,074	2,380	94	199	1,340

PLATE XIII.—View showing Falls in Wolfe Creek northeast of Fayetteville over one of the sandstone ledges of the New River Group.

The last column of the preceding table shows a total of 1340 coke ovens, all of the beehive type, that were not in use during the year ending June 30, 1916, or 56.3 per cent. of the total number reported for the County.

MINABLE COAL BEDS IN FAYETTE COUNTY.

In the territory of this Report there appear to be 20 separate and distinct minable coal beds, in addition to 27 others that are too thin, impure and irregular to warrant such classification. These are grouped as follows:

	Number of Minable Beds.	Number of Unminable Beds.	Total Number.
Allegheny Series.............	2	1	3
Kanawha Group, Pottsville...	14	11	25
New River Group, Pottsville..	2	11	13
Pocahontas Group, Pottsville..	2	4	6
Totals	20	27	47

These are exhibited by the two following figures in descending order, the minable beds being represented by the heavily shaded lines, and the approximate intervals, roughly the maximum, expressed in feet. Figure 3 shows those for the Allegheny Series and the Kanawha Group of the Pottsville; and Figure 4, the New River and Pocahontas Groups of the latter series, the figures being given on pages 386 and 387.

RECORDS OF COAL TEST BORINGS.

SUMMARIZED RECORDS.

In Fayette County a total of 138 borings have been sunk mostly with diamond drill, to test the several coal beds. The detailed records or logs of a large number of these were secured for publication in detail or in part through the courtesy of individuals and the large land-holding companies, while for many others these were refused. The table below gives a complete list of all such borings observed within Fayette, in addition to 24 others in the immediately adjoining portions of Kanawha, Greenbrier, and Raleigh Counties. While it lacks

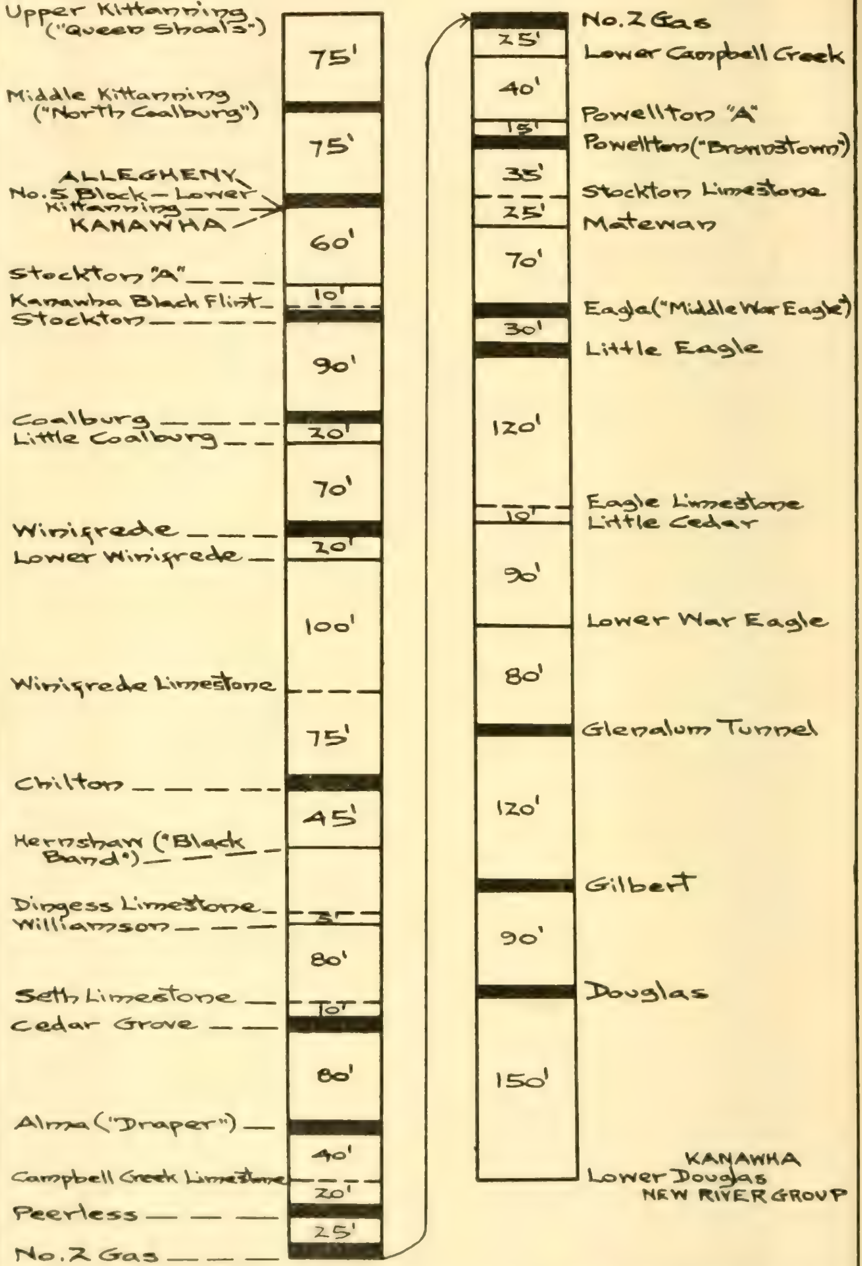


Figure 3.— Showing Approximate Intervals in Feet Between Coal Seams and Important Limestones in Allegheny Series and Kanawha Group of Pottsville in Fayette County.

R.C.T.

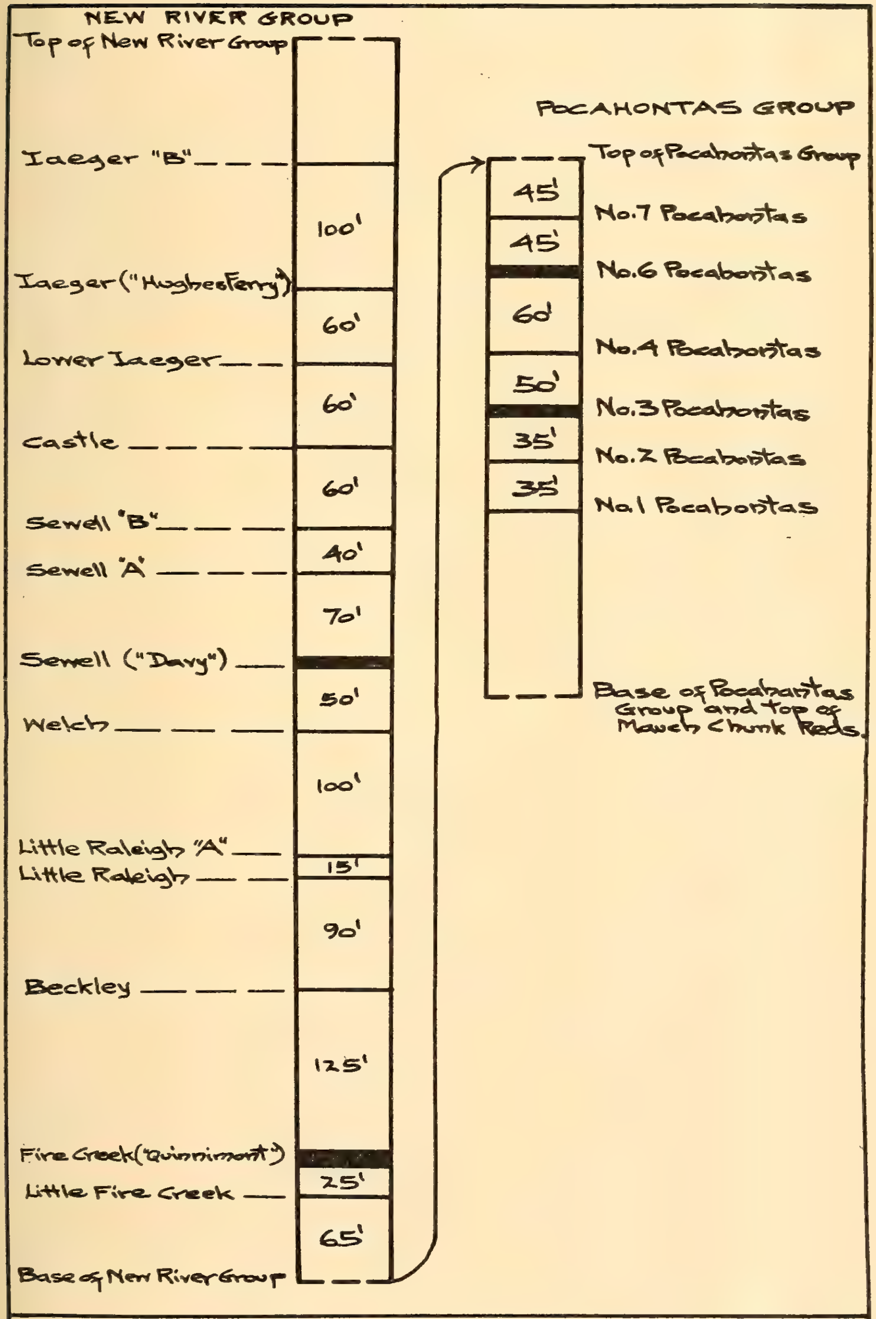


Figure 4.—Showing Approximate Intervals in Feet Between Coals of New River and Pocahontas Groups in Fayette County. R.C.T.

many details which the complete logs would have afforded, yet the table gives much information of value. With the exception of Nos. 111, 119, and 120, permission was given to publish only the depths to the coal beds—omitting the thickness—and the total depths of the borings in all those listed for the New River and Pocahontas Consolidated Coal Company. Elevations, depths, and thicknesses are expressed in feet. The first and last columns give the serial number designating the boring on Map II, this number always being given when the well is mentioned in the text of this Report. Practically all of them were visited in the field and the geologic horizon of their well-mouths determined as near as possible. Under the elevation column, the letter "B" indicates barometric measurements, checked on the nearest U. S. Geological Survey elevations marked on base maps or topographic sheets, and the letter "L", a spirit-level determination. Under the column headed "Company or Individual", the following abbreviations are used:

Abbreviations.	Full Names.
Babcock C. & C. - - -	Babcock Coal & Coke Company.
Beury Bros. - - - -	Beury Bros. Coal & Coke Compeny.
Brackens Creek - - -	Brackens Creek Coal & Land Company
Columbus I. & S. - - -	Columbus Iron & Steel Company.
Fayetteville L. Co. - - -	Fayetteville Land Company.
Gallego L. Co - - - -	Gallego Land Company.
Gauley Mountain - - -	Gauley Mountain Coal Company.
Hawkins L. Co. - - -	Hawkins Land Company.
Keefer C. L. Co. - - -	Keefer Coal Land Company.
Keeneys Creek - - - -	Keeneys Creek Colliery Company.
Loup Creek - - - - -	Loup Creek Colliery Company.
Low Moor - - - - -	Low Moor Iron Company.
McKinley L. Co. - - - -	McKinley Land Company
N. R. and Poca - - - -	New River & Pocahontas Consolidated Coal Company.
New Riv. Col. - - - - -	New River Collieries Company.
Plum Orchard - - - - -	Plum Orchard Coal & Land Company.
Rocklick C. Co. - - - -	Rocklick Coal Company.
Star C. & C. - - - -	Star Coal & Coke Company
Stuart Col. Co. - - - -	Stuart Colliery Company.
Thayer C. & C. - - - -	Thayer Coal & Coke Company.

Summarized Records of Borings—Fayette and Adjoining Region.

No. on Map II.	Farm Name	Magisterial District.	Company or Individual.	Elevation above sea-level	No. 2 Gas Coal		Eagle Coal		Hughes Ferry Coal		Sewell Coal		Beckley Coal		Fire Creek Coal		Total Depth	No. on Map II.
					Depth Base	Thickness	Depth Base	Thickness	Depth Base	Thickness	Depth Base	Thickness.	Depth Base	Thickness	Depth Base	Thickness		
1	Jno. Q. Dickinson No. 2	(Kanawha Co.)	I. Q. Dickinson	850B	299.4	2.5											336.4	1
2	Columbus I. & S. Co. No. 3	Falls	Columbus I. & S.	1120B	23.8	6.8	166	3.8									168.5	2
3	C. C. Sharp No. 1	Falls	Columbus I. & S.	1030B	159.3	2.5	296.5	3.5									308.3	3
4	Columbus I. & S. Co. No. 1	Falls	Columbus I. & S.	1035B	99.6	5.6	245	4.0									250.5	4
5	C. C. Sharp No. 1	Falls	Columbus I. & S.	960B	25.8	4.3	178	4.6									183.8	5
6	W. R. Johnson	Falls	- - (?) - -	1105B	313.5	9	448.3	3.3									451.3	6
7	Columbus I. & S. Co.	Falls	Columbus I. & S.	1025B	0		178.6	4.6									183.6	7
8	Sunday Creek Co. No. 1	Falls	Sunday Creek Co.															8
9	Sunday Creek Co. No. 2	Falls	Sunday Creek Co.															9
10	C. Reeder Heirs	Kanawha	- - (?) - -	650L													509.9	10
11	C. Reeder Heirs	Kanawha	- - (?) - -	672L													135	11
12	Keystone Coal Co.	(Kanawha Co.)	Keystone Coal Co.	795B	33.7	6.9	153.1	2.8									166.8	12
13	Loup Creek Col. Co.	Kanawha	- - (?) - -	1400B					417.7	0.7		0					751	13
13A	Loup Creek Col. Co.	Kanawha	Loup Creek	1120L					207	0.7		0					861	13A
14	Loup Creek Col. Co.	Kanawha	Loup Creek	1355B							351.2	1.4	543.3	1.7			659.5	14
15	Gallego Land Co. No. 1	Kanawha	Gallego L. Co.	1225R					29.8	0.8	263.3	1			597.3	0.3	999.8	15
16	Gauley Mountain Coal Co.	Mountain Cove	Gauley Mountain	1333L					339.8	0.8	533.3	3					543	16
17	Geo Hawver water well	Mountain Cove	Geo. Hawver	1900B													41	17
18	Nuttall Heirs	Nuttall	Nuttall Heirs	1600B														18
19	Nuttall Heirs	Nuttall	Nuttall Heirs	1965B														19
20	Nuttall Heirs	Nuttall	Nuttall Heirs	1950B														20
21	Nuttall Heirs	Nuttall	Nuttall Heirs	2410B														21
22	Nuttall Heirs	Nuttall	Nuttall Heirs	2005B														22
23	Nuttall Heirs (water well)	Nuttall	Keeneys Creek	1860B							86.0	4					90	23
24	Nuttall Heirs	Nuttall	Nuttall Heirs	2160B														24
25	Brackens Creek Coal & Land Co.	Nuttall	Brackens Creek	2134L							167.8	2.2					306	25
26	Mrs. E. T. Martin	(Greenbrier Co)	Nutter Heirs	1930B											263	0	368	26

No. on Map II	Farm Name	Magisterial District	Company or Indnvidual	Elevation above sea-level	Hughes Ferry Coal		Sewell Coal		Beckley Coal		Fire Creek Coal		Little Fire Creek Coal				Total Depth	No. on Map II.
					Depth Base	Thickness.	Depth Base	Thickness.	Depth Base	Thickness.	Depth Base	Thickness.	Depth Base	Thickness.				
27	Low Moor Iron Co. (water well)	Fayetteville	Low Moor	896L													61	27
28	Henry Light No. 5	Fayetteville	Hawkins L. Co.	1805L			389.2	4.1									400.1	28
29	Hawkins Land Co. No. 8	Fayetteville	Hawkins L. Co	1650B			522.8	4.3									526.8	29
30	Keefer Coal Land Co. No. 1	Fayetteville	Keefer C. L. Co.	1325B			357.6	1.8									383.2	30
31	Keefer Coal Land Co. No. 2	Fayetteville	Keefer C. L. Co.	1285B	111.5	0											420.8	31
32	Keefer Coal Land Co. No. 3	Fayetteville	Keefer C. L. Co.	1320B	141	0.4		0									431.7	32
33	Coleman Heirs	Fayetteville	Hawkins L. Co.	1340B														33
34	Evans No. 7	Fayetteville	Hawkins L. Co.	1630L	134.6	5.1	397.3	5.5									407.9	34
35	Loup Creek Col Co No 2	Fayetteville	Loup Creek	1406L		0	(340)	0	589	2							667	35
36	Hawkins Land Co. No. 1	Fayetteville	Hawkins L. Co.	1590B	117.7	0.5	353.7	4.3	544.9	4.2							551.2	36
36A	Stuart Colliery Co.	Fayetteville	Stuart Col. Co.	2020B														36A
37	Collins Boring	Fayetteville	Stuart Col. Co.	1995L					736	3.3							736	37
38	Hawkins Land Co. No. 9	Fayetteville	Hawkins L. Co.	1970B	383.4	0	694.6	4.1									703.4	38
39	Stuart Colliery Co.	Fayetteville	Stuart Col. Co.															39
40	Jno. Tuggles	Fayetteville	W. P. Rend	1895B														40
41	New Riv. Col. Co. No. 68	Fayetteville	New Riv. Col	1620L							272.5	1.4					324.4	41
42	New Riv. Col. Co. No. 67	Fayetteville	New Riv. Col	2020.5L	38.5	0.9	281.8	4.3	494.1	2.5	605.5	5.4					608	42
43	New Riv. Col. Co. No. 70	Fayetteville	New Riv. Col															43
44	New Riv Col. Co. No. 69	Fayetteville	New Riv. Col															44
45	New Riv. Col. Co. No. 65	Fayetteville	New Riv. Col	1852L			133.9	4.2	362.4	1.8	436.9	3.4	462.5	1.0			465	45
46	New Riv Col. Co. No. 66	Fayetteville	New Riv. Col	1945B			244.9	4.2	460.9	0.5	592.6	0.4	603.8	0.5			623.3	46
47	Rocklick Coal Co. No. 2	Fayetteville	Rocklick C. Co.	1750B														47
48	Rocklick Coal Co. No. 1	Fayetteville	Rocklick C. Co.	1640B														48
49	Rocklick Coal Co. No. 3	Fayetteville	Rocklick C. Co.	1640B														49
50	W. P. Rend	Fayetteville	W. P. Rend	1545B							206	(1)						50
50A	N. R. & Poca Consol C. Co.	Fayetteville	N. R. & Poca	2045B														50A
51	H. R. Sanger	Fayetteville	N. R. & Poca															51

Summarized Records of Borings—Fayette and Adjoining Region.—(Continued).

No. on Map 11.	Farm Name	Magisterial District.	Company or Individual.	Elevation above sea-level	Hughes Ferry Coal		Sewell Coal		Beckley Coal		Fire Creek Coal		No. 6 Pocahontas Coal		No. 3 Pocahontas Coal		Total Depth	No. on Map 11.
					Depth Base	Thickness	Depth Base	Thickness	Depth Base	Thickness	Depth Base	Thickness	Depth Base	Thickness.	Depth Base	Thickness		
52	Star Coal & Coke Co	Fayetteville	Star C. & C.	1725B														52
53	Harrison Toney	Fayetteville	Fayetteville L. Co.	1725B	170.2	0.8	402.4	8.6	612.3	0	713.8	0					812.8	53
54	Mossy Coal & Land Co	Fayetteville		1475B														54
55		Fayetteville		1605B														55
56	Painter No. 1	Fayetteville	Plum Orchard	1649L	115	1	365.2	3.2		0		0		0		0	1215	56
57	Jno. Lively	Fayetteville	Boone Coal Co	1625B														57
57A	H. S. Lively	Fayetteville	Boone Coal Co	1640B														57A
58	Deal No. 1	Fayetteville	Plum Orchard	1700B	12.9	0.8	289.4	2.4		0	649.9	0.3					954.3	58
59	Plum Orchard C. & L. Co	Fayetteville	Plum Orchard	1630B														59
60	Plum Orchard C. & L. Co	Fayetteville	Plum Orchard	1685B			(409.2)	(3.7)									445	60
61	E. J. Berwind No. 4	Fayetteville	E. J. Berwind	1897L			409.4	6.3									411.8	61
62	E. J. Berwind No. 25	Fayetteville	E. J. Berwind	1676L			365.9	4.9									369.3	62
63	McKinley Land Co.	Fayetteville	McKinley L. Co.	1640B														63
64	McKinley Land Co.	Fayetteville	McKinley L. Co.	1760B														64
65	McKinley Land Co. No. 2	Fayetteville	McKinley L. Co.	1732L			285.9	4.3									317	65
66	E. J. Berwind No. B16	Fayetteville	E. J. Berwind	1772L			304.9	4.6			617.9	0.9					625	66
67	E. J. Berwind No. B3	Fayetteville	E. J. Berwind	1873L	104	0.5	388.8	4.2									391.2	67
68	McKinley Land Co. No. B	Fayetteville	McKinley L. Co.	1060L	152	0	472.8	1.4									513.5	68
69	Bolen No. 1	Fayetteville	New River Co.	1625B														69
70	Plum Orchard C. & L. Co	Fayetteville	Plum Orchard	1680B			(7)											70
71	Jas. William ?	Fayetteville	Boone Coal Co.	1775B														71
72	Plum Orchard C. & L. Co	Fayetteville	Plum Orchard	1715B														72
73	Jos. McCoy	Fayetteville	Wm. McKell	1750B														73
74	Davis, Fudge et al. No. 3	Fayetteville	New River Co.	1890L			356	4									358	74
75	Davis, Fudge et al. No. 2	Fayetteville	New River Co.	2058L	244	0.7	507.3	10.3									507.3	75
76	Davis, Fudge et al. No. 1	Fayetteville	New River Co.	1995L	155.9	0.9	418.7	3.7									612.3	76
77	Plum Orchard C. & L. Co	Fayetteville	Plum Orchard	1842L			229.7	11.2	478.8	0.7	540.7	1.3	(692.7)	0	774.9	2.5	857.9	77
78	McKinley Land Co	Fayetteville	McKinley L. Co.	1871L														78
79	Davis & Fudge	Fayetteville	W'm. McKell	1810B														79
79A	F. N. Smith	Fayetteville	F. N. Smith	1715B			(-35)		233	1.3	293,6	1.1	401.6	2.9			406.4	79A
80	Price Hill Fuel Co. No. 4	(Raleigh Co.)	New River Co.	2119L	215.5	1	465.5	4									470.5	80
81	Price Hill Fuel Co. No. 6	(Raleigh Co.)	New River Co.	2234L			504.8	5.2	726.7	2.7	831.3	0.5	1000.6	0.5			1002.1	81
82	Price Hill Fuel Co. No. 9	(Raleigh Co.)	New River Co.	2286L			458.8	3.8									461	82
83	Price Hill Fuel Co. No. 7	(Raleigh Co.)	New River Co.	2348L			581.6	4.6									582.7	83
84	Russell Land Co. No. 10	(Raleigh Co.)	New River Co.	2126L			434.8	0.6									462	84
85	E. J. Berwind No. B6	(Raleigh Co.)	E. J. Berwind	1865L			276.3	3.9									278.5	85
86	Enoch Smith No. B20	(Raleigh Co.)	McKinley L. Co.	2035L			447.4	3.2									453.4	86
87	Enoch Smith No. B23	(Raleigh Co.)	E. J. Berwind	2113L			534	7									537	87
88	Enoch Smith No. B19	(Raleigh Co.)	E. J. Berwind	2073L			490.4	2	714.3	4.8							723.4	88
89	E. J. Berwind No. B2	(Raleigh Co.)	E. J. Berwind	2003L	136.1	0.1	462.9	9.1									535.9	89
90	E. J. Berwind No. C	(Raleigh Co.)	E. J. Berwind	1786L			285.4	16.1									300.2	90
91	McKinley Land Co	(Raleigh Co.)	McKinley L. Co.	1655B			256.0	2.5									300	91
92	Wm. Taylor	Sewell Mountain	Nuttall Heirs	2155B							111.9							92
93	Brackens Creek Coal & Land Co. No. 2	Sewell Mountain	Nuttall Heirs	2357L			159.4	1.5									365	93
93A	Brackens Creek Coal & Land Co.	Sewell Mountain	Nuttall Heirs	2050B														93A
93B	Brackens Creek Coal & Land Co. No. 4	Sewell Mountain	Brackens Creek	2124L			144	2.5									247.5	93B
93C	Brackens Creek Coal & Land Co. No. 3	Sewell Mountain	Brackens Creek	2345L			227.5	3.5									229	93C
93D	Brackens Creek Coal & Land Co. No. 1	Sewell Mountain	Brackens Creek	2431L			182.7	1.1									300	93D
94	Charles White	Sewell Mountain	Nuttall Heirs	2460B			241.6	3.9										94
95	Nuttall Heirs	Sewell Mountain	Nuttall Heirs	2655B														95
96	Nuttall Heirs	Sewell Mountain	Nuttall Heirs	2545B													(600?)	96
97	Jno. Jordan-Amick	Sewell Mountain	Babcock C. & C. Co.	2430B							225.2	3.2						97
98	Babcock C. & C. Co. No. 7	Sewell Mountain	Babcock C. & C. Co.	2385B														98
99	Babcock C. & C. Co. No. 6	Sewell Mountain	Babcock C. & C. Co.	2505B														99
100	Thayer C. & C. Co. No. 9	Sewell Mountain	Thayer C. & C. Co.	2676L														100
101	Babcock C. & C. Co. No. 2	Sewell Mountain	Babcock C. & C. Co.	2255B														101
101A	Babcock C. & C. Co. No. 1	Sewell Mountain	Babcock C. & C. Co.	1950B														101A

Summarized Records of Borings—Fayette and Adjoining Region.—(Concluded).

No. on Map II.	Farm Name	Magisterial District.	Company or Individual.	Elevation above sea-level	Sewell Coal		Beckley Coal		Fire Creek Coal		Little Fire Creek Coal		No. 6 Pocahontas Coal		No. 3 Pocahontas Coal		Total Depth	No. on Map II.
					Depth Base	Thickness	Depth Base	Thickness	Depth Base	Thickness	Depth Base	Thickness	Depth Base	Thickness	Depth Base	Thickness		
102	Babcock C. & C. Co. No. 3	Sewell Mountain	Babcock C. & C. Co.															102
103	Babcock C. & C. Co. No. 5	Sewell Mountain	Babcock C. & C. Co.															103
104	Babcock C. & C. Co. No. 4	Sewell Mountain	Babcock C. & C. Co.															104
105	Thayer C. & C. Co. No. (10)	Sewell Mountain	Thayer C. & C. Co.	2560.4L														105
106	Thayer C. & C. Co. No. 1	Sewell Mountain	Thayer C. & C. Co.	2702.5L														106
107	Thayer C. & C. Co. No. 8	Sewell Mountain	Thayer C. & C. Co.	2751L														107
108	Wm. Beury	Sewell Mountain	Beury Bros.	1950B														108
109	Thayer C. & C. Co. No. 6	Sewell Mountain	Thayer C. & C. Co.	2731L														109
110	Thayer C. & C. Co. No. 7	Sewell Mountain	Thayer C. & C. Co.	2839L														110
111	Beury No. 3	Sewell Mountain	N. R. & Poca.	2545L			111.3	0.4	247.3	3.8	262.3	1					300	111
112	N. R. & Poca. Consol. Coal Co. No. 19	Sewell Mountain	N. R. & Poca.	2641L					128.8		150.8		279.8				282	112
113	N. R. & Poca. Consol. Coal Co. No. 20	Sewell Mountain	N. R. & Poca.	2595L					141.3		191.0		305.9		440.2		495	113
114	N. R. & Poca. Consol. Coal Co. No. 8NS.	Sewell Mountain	N. R. & Poca.	2976L					348.3				435.5					114
115	N. R. & Poca. Consol. Coal Co. No. 22	Sewell Mountain	N. R. & Poca.	2801L			123.5		266.5		273.1						277.5	115
116	N. R. & Poca. Consol. Coal Co. No. 18	Sewell Mountain	N. R. & Poca.	2571L			44.8		176.9		238.3		327.7				336.3	116
117	N. R. & Poca. Consol. Coal Co. No. 2	Sewell Mountain	N. R. & Poca.	2863L					371.1								419.8	117
118	N. R. & Poca. Consol. Coal Co. No. 1	Sewell Mountain	N. R. & Poca.	2621L			154.5		309.8		322		402.3				513.1	118
119	N. R. & Poca. Consol. Coal Co. No. 5	Sewell Mountain	N. R. & Poca.	2554L			149.8	1.1	289.5	3.4							291.5	119
120	N. R. & Poca. Consol. Coal Co. No. 21	Sewell Mountain	N. R. & Poca.	2560L			54.4	0.6	214.8	4.5							215	120
121	N. R. & Poca. Consol. Coal Co. No. 17	Sewell Mountain	N. R. & Poca.	2739L					315.9								386	121
122	N. R. & Poca. Consol. Coal Co. No. 15	Quinnimont	N. R. & Poca.	2781L					326.2		342.9						343.3	122
123	N. R. & Poca. Consol. Coal Co. No. 14	Quinnimont	N. R. & Poca.	2584L					64.6								219	123
124	N. R. & Poca. Consol. Coal Co. No. 10	Quinnimont	N. R. & Poca.	2564L									146.9				150	124
124A	N. R. & Poca. Consol. Coal Co. No. 11	Quinnimont	N. R. & Poca.	2722L					185.8				297.8				328	124A
125	N. R. & Poca. Consol. Coal Co. No. 4	Quinnimont	N. R. & Poca.	2865L					327.3				436.9				459.3	125
126	N. R. & Poca. Consol. Coal Co. No. 3	Quinnimont	N. R. & Poca.	2904L					290.7		330.7		425.3		521.5		533	126
127	N. R. & Poca. Consol. Coal Co. No. 23	Quinnimont	N. R. & Poca.	2978L					267.4		307.8		409.9		475.3		511	127
128	N. R. & Poca. Consol. Coal Co. No. 7NS.	Quinnimont	N. R. & Poca	3213L					411.7				497.5					128
129	N. R. & Poca. Consol. Coal Co. No. 12	Quinnimont	N. R. & Poca	2872L			83.3		256.1				397.8				438.7	129
130	N. R. & Poca. Consol. Coal Co. No. 6NS.	Quinnimont	N. R. & Poca.	3120L					(106)				(532.2)					130
131	N. R. & Poca. Consol. Coal Co. No. 5NS.	Quinnimont	N. R. & Poca	(3035B 2804L?)														131
132	N. R. & Poca. Consol. Coal Co. No. 8	Quinnimont	N. R. & Poca	2741L					44.8				215.9				232.8	132
133	N. R. & Poca. Consol. Coal Co. No. 9	Quinnimont	N. R. & Poca	2719L					55.8		80.4		201.3		305.4		335	133
134	N. R. & Poca. Consol. Coal Co. No. 13	Quinnimont	N. R. & Poca	2844L					154.4		191.9		313.9		410.4		421.2	134
135	N. R. & Poca. Consol. Coal Co. No. 7	Quinnimont	N. R. & Poca.	2774L									114.3		217		332.5	135
136	N. R. & Poca. Consol. Coal Co. No. 16	Quinnimont	N. R. & Poca.	(2810B)									136.2				141	136
137	N. R. & Poca. Consol. Coal Co. No. 4NS.	Quinnimont	N. R. & Poca.	2914L									184.2					137
138	N. R. & Poca. Consol. Coal Co. No. 6	Quinnimont	N. R. & Poca.	2741L									119.2		227.9		232	138
139	N. R. & Poca. Consol. Coal Co. No. 3NS.	Quinnimont	N. R. & Poca.	2895L					128.1				209.2					139
140	N. R. & Poca. Consol. Coal Co. No. 24	Quinnimont	N. R. & Poca.	(2715B 2746L)									111.9		202.6		205	140
141	N. R. & Poca. Consol. Coal Co. No. 1NS.	Quinnimont	N. R. & Poca.	3074L					438.3				530.5					141
142	N. R. & Poca. Consol. Coal Co. No. 2NS.	Quinnimont	N. R. & Poca.	3080L					372.5				468.5					142
143	Huling et al. No. 5	(Raleigh Co.)	Huling et al.	2810B											190.3	6.2	215	143
144	Huling et al. No. 3	(Raleigh Co.)	Huling et al.	2805B					97.2	0.3							202	144
145	Huling et al. No. 7	(Raleigh Co.)	Huling et al.	2795B					88.8	0.6			279.3	1.1			283	145
146	Huling et al. No. 2	(Raleigh Co.)	Huling et al.	2830B			167	0.3	203.7	4.3	264.3	0.3					299	146
147	Huling et al. No. 4	(Raleigh Co.)	Huling et al.	2755B			54	1	154.6	5							156	147
148	Huling et al. No. 1	(Raleigh Co.)	Huling et al.	2760B			73.6	1.1	179.9	0.9			(298.8)	7			302	148
149	Huling et al. No. 6	(Raleigh Co.)	Huling et al.	2800B			161	0.8	199.6	2.6							201	149
150	Royal No. 1	(Raleigh Co.)	New River Col. Co.	2419L			102.4	1.3	228.8	3.1	251.9	0.5			524.3	12	530.6	150
151	Royal No. 2	(Raleigh Co.)	New River Col. Co.	2509L			165.2	0.9	282.1	2.3	321.8	0.5					342.3	151

DETAILED BORING RECORDS, FALLS DISTRICT.

In the accompanying table, 8 coal test borings are listed for Falls and 1 in the immediately adjoining portion of Kanawha County, all of which are shown on Map II by Nos. 1 to 9, inclusive. The only information that could be obtained for **Nos. 8 and 9 on Map II** is that given in the table of boring records. The detailed logs of Nos. 1 to 7 on Map II will now be given.

John Q. Dickinson Coal Test Boring No. 2 (No. 1 on Map II).

In Cabin Creek District, on north bank of Bells Creek 0.3 mile northwest of common corner of Clay, Nicholas, Fayette, and Kanawha Counties; authority, C. E. Krebs; elevation, 850′ B.

		Thickness.		Total.		
		Ft.	In.	Ft.	In.	
Surface		22	3	22	3	
Shale		4	0	26	3	
Sandstone		9	0	35	3	
Shale, sandy		10	4	45	7	
Fire clay		0	8	46	3	
Coal and bone 0′ 3″ Shale 0 3 **Coal and bone** 0 6	**Little Chilton**	1	0	47	3	47′ 3″
Fire clay		0	6	47	9	
Shale, sandy		1	7	49	4	
Sandstone		26	10	76	2	
Shale, sandy		5	0	81	2	
Coal and bone 0′ 7″ **Coal** 0 9 **Coal and bone** 0 2 **Coal** 0 7 Sandstone 0 1 **Coal** 0 11	**Hernshaw**	3	1	84	3	37′ 0″
Shale, sandy		3	0	87	3	
Sandstone		4	1	91	4	
Shale, green		0	3	91	7	
Sandstone		14	0	105	7	
Shale, sandy		1	9	107	4	
Coal and bone		0	2	107	6	
Shale with **coal** streaks		0	5	107	11	
Fire clay		2	0	109	11	
Shale, sandy		21	0	130	11	
Sandstone		5	3	136	2	
Shale, sandy		4	7	140	9	
Bone and **coal**. 0′ 3″ **Coal** 0 3	**Williamson**	0	6	141	3	57′ 0″
Shale, sandy		24	4	165	7	
Slate		1	3	166	10	
Shale		0	3	167	1	
Coal, Cedar Grove "Rider"		0	2	167	3	

	Thickness.		Total.		
	Ft.	In.	Ft.	In.	
Fire clay	2	0	169	3	
Shale, sandy	11	9	181	0	
Sandstone	8	4	189	4	
Shale, sandy	10	0	199	4	
Sandstone, **Peerless**	57	7	256	11	
Shale, sandy	16	10	273	9	
Coal 1′ 8″ Fire clay 0 8 **Coal and bone** 0 2 } **Peerless**	2	6	276	3	135′ 0″
Shale, sandy	19	10	296	11	
Coal, No. 2 Gas	2	6	299	5	23′ 2″
Fire clay	2	10	302	3	
Shale, sandy	5	2	307	5	
Sandstone, **Brownstown**	6	0	313	5	
Shale, sandy	3	2	316	7	
Coal and bone, Powellton "A"	1	0	317	7	
Shale, sandy	14	3	331	10	
Coal 1′ 10″ Fire clay 0 8 **Coal** 0 11 } **Powellton**	2	7	334	5	35′ 0″
Fire clay	2	0	336	5	2′ 0″

The above boring, correcting for dip, starts 300 feet below the outcrop of the Kanawha Black Flint ledge in the hill to the north, as determined by Teets. The thin coal 8 inches below the main bench of the Peerless is characteristic of this bed eastward in Nicholas County. The Cedar Grove appears to be absent entirely.

Columbus Iron & Steel Company Coal Test Boring No. 3 (No. 2 on Map II).

In Falls District, on west bank of Left Fork of Big Creek, 2.4 miles west of Gamoca; authority, Columbus Iron & Steel Company; completed, April 8, 1916; elevation, 1120′ B.

	Thickness.		Total.		
	Ft.	In.	Ft.	In.	
Casing	16	0	16	0	
Slate	1	0	17	0	
Coal 2′ 6″ Slate 1 5 **Coal** 2 10 } **No. 2 Gas**	6	9	23	9	23′ 9″
Fire clay	1	0	24	9	
Light shale	14	6	39	3	
Coal, Lower Campbell Creek	1	3	40	6	
Light shale	7	6	48	0	
Coal, Powellton	2	5	50	5	26′ 8″
Fire clay	1	7	52	0	
Sandy shale	10	0	62	0	
Light shale	12	0	74	0	
Soft sandstone	30	0	104	0	

	Thickness.		Total.	
	Ft.	In.	Ft.	In.
Light shale	21	0	125	0
Coal, Matewan	2	3	127	3
Light shale	6	0	133	3
Sandy shale	20	0	153	3
Light shale	9	0	162	3
Coal ....2′ 0 ″				
Slate .... 0 0½ } **Eagle**	3	9½	166	0½
Coal 1 9				
Soft sandstone, **Decota**, to bottom	2	5½	168	6

C. C. Sharp Coal Test Boring No. 1 (No. 3 on Map II).

In Falls District, on east bank of Smithers Creek, 0.8 mile northeast of Marting; authority, Columbus Iron & Steel Company; completed, March, 1916; elevation, 1030′ B.

	Thickness.		Total.		
	Ft.	In.	Ft.	In.	
Surface	14	0	14	0	
Sandstone	27	0	41	0	
Shale, sandy	1	6	42	6	
Sandstone	22	0	64	6	
Shale	9	6	74	0	
Sandstone	36	6	110	6	
Coal and shale	0	8	111	2	
Shale	1	4	112	6	
Shale, dark	12	6	125	0	
Coal and slate	0	6	125	6	
Shale	10	0	135	6	
Slate	15	6	151	0	
Coal, Peerless	1	4	152	4	
Slate	4	6	156	10	
Coal, No. 2 Gas	2	6	159	4	159′ 4″
Slate	9	0	168	4	
Coal	0	8	169	0	
Slate	0	2	169	2	
Sandstone, slaty	8	6	177	8	
Coal	0	11	178	7	
Sandstone, slaty	14	6	193	1	
Coal and slate, **Powellton**	0	8	193	9	
Fire clay	1	0	194	9	
Slate	2	0	196	9	
Sandstone, slaty	5	0	201	9	
Sandstone	5	0	206	9	
Slaty sandstone	48	3	255	0	
Coal, Matewan	1	10	256	10	
Sandstone, slaty	7	2	264	0	
Sandstone	10	0	274	0	
Sandstone, slaty	7	0	281	0	
Shale, dark	12	0	293	0	
Coal .... 1′ 3″					
Parting .... 0 1 } **Eagle** ..	3	6	296	6	
Coal 2 2					
Sandstone	11	10	308	4	

Columbus Iron & Steel Co. Coal Test Boring No. 1 (No. 4 on Map II).

In Falls District, on Rattlesnake Fork of Smithers Creek, near forks of hollow, 0.4 mile east of Marting; authority, Columbus Iron & Steel Company; completed, February 17, 1916; elevation, 1035′ B.

		Thickness.		Total.		
		Ft.	In.	Ft.	In.	
Casing		9	0	9	0	
Soft sandstone		37	0	46	0	
Black slate		2	0	48	0	
Light shale		8	0	56	0	
Sandy shale		6	0	62	0	
Light shale		14	0	76	0	
Dark shale		15	0	91	0	
Black slate		3	0	94	0	
Coal, No. 2 Gas		5	7	99	7	99′ 7″
Fire clay		1	5	101	0	
Light shale		14	0	115	0	
Dark shale		7	0	122	0	
Coal 0′ 1″	**Powellton**	3	10	125	10	26′ 3′
Slate 0 1						
Coal 0 8						
Slate 0 1½						
Coal 0 3						
Slate 0 4½						
Coal 0 8						
Slate 0 0½						
Coal 0 2½						
Slate 0 5						
Coal 0 11						
Fire clay		2	0	127	10	
Light shale		18	2	146	0	
Soft sandstone		4	0	150	0	
Light shale		36	0	186	0	
Sandy shale		19	0	205	0	
Coal, Matewan		1	4	206	4	
Dark shale		1	0	207	4	
Soft sandstone, **Eagle**		18	8	226	0	
Sandy shale		13	5	239	5	
Black slate		1	7	241	0	
Coal 1′ 10″	**Eagle**	4	0	245	0	119′ 2″
Binder 0 0½						
Coal 2 1½						
Soft sandstone, **Decota**, to bottom		5	5½	250	5½	5′ 5½″

C. C. Sharp Coal Test Boring No. 1 (No. 5 on Map II).

In Falls District, on west bank of Smithers Creek at mouth of Rattlesnake Hollow, at Marting; authority, Columbus Iron & Steel Company; elevation, 960′ B.

	Thickness.		Total.	
	Ft.	In.	Ft.	In.
Surface	8	0	8	0
Shale	13	6	21	6

			Thickness.		Total.		
			Ft.	In.	Ft.	In.	
Coal, bone	1′ 6″	**No. 2 Gas**	4	4	25	10	25′ 10″
Coal, gas	0 9						
Slate	0 1						
Coal, gas	2 0						
Sandstone, slaty			9	4	35	2	
Slate			1	0	36	2	
Coal, Lower Campbell Creek			0	5	36	7	
Slate			2	0	38	7	
Sandstone, **Brownstown**			14	5	53	0	
Slate			10	0	63	0	
Coal	1′ 8″	**Powellton**	6	10	69	10	44′ 0″
Slate	0 4						
Coal	0 5						
Bone and slate	0 5						
Coal	0 11						
Slate	0 11						
Coal	1 0						
Slate	0 2						
Coal	1 0						
Slate			0	6	70	4	
Sandstone			29	0	99	4	
Slate and shale			20	10	120	2	
Coal, Matewan			1	3	121	5	
Shale			5	3	126	8	
Sandstone, **Eagle**			42	3	168	11	
Sandstone, slaty			4	0	172	11	
Slate			0	6	173	5	
Coal	1′ 5″	**Eagle**	4	7	178	0	108′ 2″
Bone and slate	0 1						
Coal	1 2						
Coal	1 7						
Slate	0 1						
Coal	0 3						
Unrecorded to bottom			5	9	183	9	

W. R. Johnson Coal Test Boring No. 4 (No. 6 on Map II).

In Falls District, on east bank of Smithers Creek near mouth of Fivemile Fork and 1.5 miles almost due north of Marting; by Columbus Iron & Steel Company, authority for record; completed, March 29, 1916; elevation, 1105′ B.

	Thickness.		Total.	
	Ft.	In.	Ft.	In.
Casing	16	0	16	0
Soft sandstone	12	0	28	0
Coal, Little Chilton	1	2	29	2
Light shale	16	0	45	2
Soft sandstone	10	0	55	2
Dark shale	7	0	62	2
Slaty coal, Hernshaw	1	6	63	8
Fire clay	1	8	65	4
Light shale	3	0	68	4
Soft sandstone	32	0	100	4
Light shale	10	8	111	0

			Thickness.		Total.	
			Ft.	In.	Ft.	In.
Sandy shale			23	0	134	0
Light shale			15	0	149	0
Dark shale			2	0	151	0
Coal, Williamson			1	0	152	0
Fire clay			2	0	154	0
Soft sandstone, **Upper Cedar Grove**			94	0	248	0
Light shale			3	0	251	0
Soft sandstone, **Peerless**			22	0	273	0
Black slate			3	0	276	0
Coal, Alma			1	1	277	1
Black slate			14	3	291	4
Coal	1' 8"	**Peerless**	2	0	293	4
Slate	0 1					
Coal	0 3					
Black slate			2	10	296	2
Sandy shale			3	6	299	8
Soft sandstone			4	4	304	0
Black slate			0	5½	304	5½
Coal	0' 9 "	**No. 2 Gas**	9	0½	313	6
Slate	0 0½					
Coal	0 8½					
Sandy shale	3 3½					
Slate	1 1					
Coal	3 0					
Bone	0 2					
Sandy shale			2	0	315	6
Soft sandstone, **Lower Campbell Creek**			8	3	323	9
Light shale			2	5	326	2
Coal, Lower Campbell Creek			0	3	326	5
Light shale			5	0	331	5
Sandy shale			8	0	339	5
Soft sandstone			3	0	342	5
Coal	1' 2"	**Powellton**	8	11	351	4
Fire clay	0 6					
Sandy shale	5 8					
Coal	0 1					
Slate	1 1					
Coal	0 5					
Fire clay			1	10	353	2
Sandy shale			50	0	403	2
Dark shale			6	0	409	2
Coal, Matewan			1	10	411	0
Fire clay			2	0	413	0
Soft sandstone, **Eagle**			16	0	429	0
Sandy shale			12	6	441	6
Black slate			3	6	445	0
Coal, Eagle			3	4	448	4
Fire clay			1	0	449	4
Soft sandstone, **Decota**, to bottom			2	0	451	4

The above boring starts 70 feet below the crop of the Winifrede Coal bed.

Columbus Iron & Steel Company Coal Test Boring No. 2 (No. 7 on Map II).

In Falls District, on east bank of Fourmile Fork, 0.7 mile southeast of Marting; by Columbus Iron & Steel Company, authority for record; completed, February 28, 1916; elevation, 1025′ B.

		Thickness. Ft.	In.	Total. Ft.	In.	
Casing		14	0	14	0	
Light shale		6	0	20	0	
Soft sandstone, **Brownstown**		20	0	40	0	
Coal .... 0′ 6″	**Powellton**	2	5	42	5	42′ 5″
Slate 0 1						
Coal 0 5						
Slate 0 5						
Coal 1 0						
Fire clay		2	0	44	5	
Soft sandstone		24	0	68	5	
Light shale		14	0	82	5	
Sandy shale		30	0	112	5	
Dark shale		8	0	120	5	
Soft sandstone, **Eagle**		39	7	160	0	
Sandy shale		12	5	172	5	
Light shale		1	3	173	8	
Black slate		0	4	174	0	
Coal, Eagle		4	7	178	7	136′ 2″
Fire clay		1	0	179	7	
Sandy shale, to bottom		4	0	183	7	5′ 0″

The above boring starts flush with the crop of the No. 2 Gas Coal bed.

DETAILED BORING RECORDS, KANAWHA DISTRICT.

As shown in the table of borings on a preceding page, only 6 coal test borings were observed in Kanawha District and one—No. 12 on Map II—in the immediately adjoining portion of Kanawha County, all of which are exhibited on Map II by Nos. 10 to 15, inclusive. The detailed logs of these will now be given.

C. Reeder Heirs Coal Test Boring (No. 10 on Map II).

In Kanawha District, on southeast bank of Kanawha River, 0.2 mile south of Kanawha Falls and 0.15 mile below mouth of Falls Creek; authority for record, Philip Konrad; completed, 1904; elevation, 650′ L.

	Thickness. Ft.	In.	Total. Ft.	In.	
Soil, clay, quicksand	21	0	21	0	
Pebble conglomerate, very hard, large boulders	3	0	24	0	
Boulders	13	0	37	0	
Sandstone, light and dark, in layers	13	6	50	6	
Sandstone, hard	6	6	57	0	
Sandstone, very hard	11	8	68	8	
Sandstone, very hard, broken, **Guyandot, Sewell Coal horizon** near base	76	4	145	0	145′ 0″
Sandstone, hard, turning to pebble conglomerate ... 3′ 9″ Pebbles, hard, quartz, conglomerate and sandstone ... 51 11 Sandstone, quartz pebbles and conglomerate ... 20 4 — **Upper Raleigh**	76	0	221	0	
Conglomerate, sandy, hard, slate	5	9	226	9	
Shale, hard, sandy, gray, sand rock in wafers	9	1	235	10	
Sandstone, hard	8	1	243	11	
Sandstone and slate	12	1	256	0	
Slate, dark, showing **coal fossils, Little Raleigh Coal**	4	2	260	2	115′ 2″
Slate, dark	4	7	264	9	
Slate, black, fire clay at finish	4	3	269	0	
Fire clay and sandstone	13	3	282	3	
Conglomerate, quartz pebbles, turning to sandstone ... 115′ 3″ Sandstone, conglomerate ... 7 6 Sandstone and conglomerate ... 10 6 — **Lower Raleigh**	133	3	415	6	
Conglomerate, quartz pebbles	5	6	421	0	
Sandstone, broken with crevices	11	11	432	11	
Sandstone and sandy shale	10	6	443	5	
Shale, sandy, and sandstone, hard	22	6	465	11	
Sandstone, soft	24	10	490	9	
Shale, sandy, and slate, to bottom	19	1	509	10	

The above boring starts 60 feet below the crop of the Hughes Ferry Coal and at a slightly greater interval below the base of the great Lower Nuttall Sandstone cliff, so that the 4′ 2″ of slaty coal at a depth of 256 feet can not possibly represent the Sewell bed, but rather the Little Raleigh seam. In this locality the Sewell Coal should belong not over 225 feet below the base of the Lower Nuttall Sandstone.

The **C. Reeder Heirs Coal Test Boring—No. 11 on Map II**—located on the east bank of Falls Creek, 250 to 300 yards southeast of Kanawha Falls railway station and drilled by Clark & Krebs according to the latter, to a depth of only 135 feet, encountered no coal. It starts at an elevation of 672′ L., 50 to 60 feet below the Hughes Ferry (Iaeger) Coal at Exposure No. 99 on Map II, therefore it hardly penetrated to the horizon of the Sewell bed.

Keystone Coal Company Coal Test Boring (No. 12 on Map II).

In Cabin Creek District, Kanawha County, ½ mile up Possum Hollow of Morris Creek, 0.7 mile southwest of Montgomery, 0.6 mile due south of mouth of Morris Creek; authority for record, C. E. Krebs; elevation, 795′ B.

			Thickness.		Total.		
			Ft.	In.	Ft.	In.	
Surface			3	0	3	0	
Slate, dark, with sandstone streaks			11	3	14	3	
Coal	2′ 0″	**Peerless**	2	6	16	9	16′ 9″
Bone	0 6						
Slate, dark			10	0	26	9	
Coal and bone	3′ 0″						
Coal	1 0	**No. 2 Gas**	6	11	33	8	16′ 11″
Shale and slate	1 7						
Coal	1 4						
Fire clay			1	7	35	3	
Bone and coal, Lower Campbell Creek			0	6	35	9	2′ 1″
Fire clay			2	6	38	3	
Shale and sandstone, green			2	2	40	5	
Sandstone	6′ 8″						
Sandstone and shale	2 5	**Brownstown**	11	11	52	4	
Sandstone and shale	2 10						
Coal and bone, Powellton "A"			0	2	52	6	16′ 9″
Fire clay			0	4	52	10	
Sandstone and shale			11	8	64	6	
Sandstone, slate			0	5	64	11	
Coal	1′ 0″						
Fire clay	1 8	**Powellton**	4	4	69	3	16′ 9″
Coal	1 3						
Coal, bone	0 5						
Slate, blue			0	5	69	8	
Sandstone			0	2	69	10	

	Thickness.		Total.		
	Ft.	In.	Ft.	In.	
Slate, dark, sandy	2	9	72	7	
Shale, sandy, and sandstone	54	2	126	9	
Sandstone, dark	2	5	129	2	
Shale and sandstone shale	4	7	133	9	
Sandstone, shaly	8	6	142	3	
Sandstone	3	2	145	5	
Shale, sandstone and coal streaks, **Eagle "Rider" Coal**	2	10	148	3	79′ 0″
Shale, dark	0	10	149	1	
Fire clay	0	11	150	0	
Sandstone, shaly	0	4	150	4	
Coal .... 2′ 5″ }					
Bone .... 0 4 } **Eagle**	2	9	153	1	4′ 10″
Fire clay	0	6	153	7	
Sandstone, dark, and shale	3	0	156	7	
Sandstone	1	8	158	3	
Shale and sandstone, shaly	6	8	164	11	
Sandstone, to bottom	1	10	166	9	13′ 8″

The above log is very important, in that it gives accurate measurements between important coal beds along the western margin of Fayette.

Loup Creek Colliery Company Coal Test Boring No. 1 (No. 13 on Map II).

In Kanawha District, on the northeast bank of Beards Fork of Loop Creek, 2.7 miles southeast of Robson P. O.; authority, C. E. Krebs; elevation, 1400′ B.

	Thickness.		Total.		
	Ft.	In.	Ft.	In.	
Sandstone and boulders	5	0	5	0	
Sandstone, rotten	13	0	18	0	
Slate, dark	5	0	23	0	
Sandstone, soft	17	0	40	0	
Slate, dark	18	1	58	1	
Coal, slaty, **Gilbert**	0	5	58	6	58′ 6″
Slate, dark	3	6	62	0	
Sandstone, soft, gray	25	0	87	0	
Slate, dark	1	0	88	0	
Sandstone, soft, gray	27	0	115	0	
Slate, dark	27	9	142	9	
Coal, Douglas	0	3	143	0	84′ 6″
Slate, gray	11	0	154	0	
Slate, dark	14	0	168	0	
Sandstone and slate, mixed	22	0	190	0	
Slate, gray	14	0	204	0	
Sandstone, white and hard	15	0	219	0	
Slate, dark, and sandstone, mixed	15	0	234	0	
Sandstone, coarse, dark, **Upper Nuttall**	71	0	305	0	
Sandstone, hard, **Lower Nuttall**	110	0	415	0	

	Thickness. Ft.	In.	Total. Ft.	In.
Slate, dark	2	0	417	0
Coal, Hughes Ferry	0	8	417	8
Fire clay	1	4	419	0
Sandstone soft, white	4	0	423	0
Sandstone, hard	5	0	428	0
Sandstone and slate, mixed	81	0	509	0
Sandstone, hard, white	186	0	695	0
Slate, dark with sandstone pebbles	5	0	700	0
Sandstone, gray	13	0	713	0
Sandstone, hard, pebbly	7	0	720	0
Sandstone, hard, gray, **Upper Raleigh**, to bottom	31	0	751	0

The above boring, visited by the author, starts slightly less than 500 feet below the No. 2 Gas Coal bed, and it reveals the absence of the Sewell seam, thus corroborating the barren region shown for the latter on Figure 20 on a subsequent page of this Chapter.

Loup Creek Colliery Company Coal Test Boring—No. 13A on Map II.

In Kanawha District, on east bank of Loop Creek, 0.4 mile south of railway station at Page; by Loup Creek Colliery Company; authority, C. E. Krebs; elevation, 1120' L.

			Thickness. Ft.	In.	Total. Ft.	In.	
Surface, sandstone, and boulders			8	0	8	0	
Sandstone, **Upper Nuttall**, soft			92	0	100	0	
Sandstone, **Lower Nuttall**, hard			51	0	151	0	
Slate, dark	4' 0"	**Upper Iaeger Shale**	55	4	206	4	
Slate, hard	44 0						
Slate, blue	7 4						
Coal, Iaeger, "Hughes Ferry"			0	8	207	0	207' 0"
Fire clay			2	0	209	0	
Sandstone and slate, mixed			40	0	249	0	
Sandstone, white, broken	22' 0"	**Harvey**	53	0	302	0	
Sandstone, fossiliferous (plants)	5 0						
Sandstone, white	26 0						
Slate and sandstone, mixed			55	0	357	0	150' 0"
Sandstone, hard and white	50' 0"	**Guyandot and Upper Raleigh**	134	0	491	0	
Conglomerate	5 0						
Sandstone, hard	55 0						
Conglomerate	2 0						
Sandstone, hard and white	22 0						
Slate, dark and hard			50	0	541	0	

	Thickness.		Total.	
	Ft.	In.	Ft.	In.
Sandstone, dark, with **thin coal partings**	1	9	542	9
Fire clay	0	3	543	0
Sandstone, fossiliferous (plants).	9	6	552	6
Slate, black	0	6	553	0
Coal, Little Raleigh "A"	0	7	553	7
Slate, dark, sandy	15	9	569	4
Coal, Little Raleigh	0	8	570	0
Fire clay	0	5	570	5
Slate, dark	12	7	583	0
Sandstone, white and hard, **Lower Raleigh, Quinnimont, and Pineville**	241	0	824	0
Slate	29	0	853	0
Sandstone, white and hard, to bottom	8	0	861	0

The above boring starts 15 feet below the top of the Upper Nuttall Sandstone as determined on the ground by the author.

Loup Creek Colliery Co. Coal Test Boring—No. 14 on Map II.

Kanawha District, on north bank of Loop Creek at mouth of Open Fork, 3.3 miles southeast of Page; by Loup Creek Colliery Company; authority, C. E. Krebs; completed, November 20, 1912; elevation, 1355′ B.

	Thickness.		Total.		
	Ft.	In.	Ft.	In.	
Sand and boulders	8	0	8	0	
Sandstone, hard, coarse, **Upper Nuttall**	27	0	35	0	
Shale, dark, with **coal partings, Iaeger "B"**	2	0	37	0	
Sandstone, hard, **Lower Nuttall**	79	0	116	0	116′ 0″
Slate, dark	30	0	146	0	
Sandstone, hard, dark	37	0	183	0	
Slate	2	0	185	0	
Sandstone, hard	33	0	218	0	
Slate, sandy	17	0	235	0	
Sandstone, hard, dark	16	0	251	0	
Slate, dark, sandy	8	0	259	0	
Sandstone, light	1	0	260	0	
Slate, dark	39	0	299	0	
Shale, dark	6	0	305	0	
Sandstone, hard	14	0	319	0	
Slate, dark, sandy	6	0	325	0	
Sandstone, light	1	6	326	6	
Slate, dark, sandy	5	6	332	0	
Sandstone, hard	17	10	349	10	
Coal, (6″, mixed with slate), **Sewell**	1	4	351	2	235′ 2″

	Thickness.		Total.		
	Ft.	In.	Ft.	In.	
Shale, blue	3	4	354	6	
Sandstone, hard	5	8	360	2	
Shale, dark	1	2	361	4	
Sandstone, hard	5	2	366	6	
Shale, sandy	2	0	368	6	
Sandstone and slate mixed	58	0	426	6	
Sandstone, hard	110	7	537	1	
Coal	0	2	537	3	
Sandstone, hard	4	5	541	8	
Coal 0′ 8″ Sandstone 0 9 **Coal** 0 3 } **Beckley**	1	8	543	4	192′ 2″
Sandstone	2	2	545	6	
Shale	1	6	547	0	
Sandstone, hard, **Quinnimont**	112	6	659	6	116′ 2″

The above boring starts 75 feet below the top of the Upper Nuttall Sandstone, as determined by the author; hence, the correlations indicated. It is located slightly over a mile northwest of the western boundary line of Sewell Coal as shown on Figure 20 on a subsequent page of this Chapter.

The detailed log of the **Gallego Land Company No. 1 Boring—No. 15 on Map II**—located near the mouth of Rattlesnake Run at Keeferton, is published in Chapter IV in connection with the Kingston Section, pages 168-9.

BORING RECORDS, MOUNTAIN COVE DISTRICT.

Only one test boring has been sunk for coal within Mountain Cove District, although another—**George Hawver Water Well—No. 17 on Map II**—located on the east edge of the public road, slightly less than one mile south of Deitz—is listed in the table of borings on a preceding page of this Chapter. This well was a churn-drill boring sunk solely for water, so that the 4 feet of coal reported at a depth of 37 feet was probably mostly slate. The well starts just below the top of the Upper Nuttall Sandstone, which would make the bed encountered correlate with the **Iaeger "B" Coal**, the stratigraphic position of which is exhibited in the log given next below for the coal test boring in the same District.

Gauley Mountain Coal Company Coal Test Boring (No. 16 on Map II).

In Mountain Cove District, on a north branch of Mill Creek, 0.5 mile north of Ansted; drilled by Gauley Mountain Coal Company; authority, W. H. Evans; completed, July 14, 1906; elevation, 1333′ L.

	Thickness.		Total.		
	Ft.	In.	Ft.	In.	
Sand and gravel	23	0	23	0	
Slate	2	0	25	0	
Shale, dark, **Douglas**	54	11	79	11	
Slate and **coal**..... 0′ 4″ Fire clay.......... 1 3 **Coal** .... 0 3 **Lower Douglas**	1	10	81	9	81′ 9″
Fire clay	1	3	83	0	
Slate, gray	3	0	86	0	
Sandstone, **Upper Nuttall**	66	2	152	2	
Coal, slaty, Iaeger "B"	2	2	154	4	72′ 7″
Slate, dark	30	8	185	0	
Slate, sandy	8	0	193	0	
Slate and sandstone	20	0	213	0	
Sandstone, **Lower Nuttall**	98	0	311	0	
Slate, dark	4	0	315	0	
Slate, sandy	15	0	330	0	
Slate, black	9	0	339	0	
Coal, slaty, **"Hughes Ferry," Iaeger**	0	9	339	9	185′ 5″
Fire clay	0	3	340	0	
Slate, dark	1	0	341	0	
Sandstone	9	0	350	0	
Sandstone and slate, mixed	15	0	365	0	
Slate, sandy	25	0	390	0	
Slate, black	7	0	397	0	
Fire clay	3	0	400	0	
Slate, gray	13	0	413	0	
Slate, black	2	0	415	0	
Coal, slaty.......... 0′ 8″ **Coal** .... 0 10 **Castle**	1	6	416	6	76′ 9″
Fire clay	0	6	417	0	
Slate, sandy	18	0	435	0	
Slate, gray, sandy	14	0	449	0	
Slate, dark	11	0	460	0	
Slate, blue	23	0	483	0	
Slate, gray	5	0	488	0	
Slate, black	12	0	500	0	
Slate, blue	21	0	521	0	
Coal, slaty, **Sewell "B"**	0	3	521	3	
Slate, gray, sandy (800′ L.)	9	1	530	4	
Coal, slaty........ 0′ 8″ **Coal**, not clean.... 2 4 **Sewell.**	3	0	533	4	116′ 10″
Slate, black, to bottom	9	8	543	0	

Correcting for the northwest dip of the strata, the above boring starts 500 feet below the No. 2 Gas Coal and 86 feet above the Upper Nuttall Sandstone, the latter being a prominent ledge slightly less than one-half mile southward in Ansted.

BORING RECORDS, NUTTALL DISTRICT

In Nuttall District seven coal test borings have been sunk and another—No. 26 on Map II—in the immediately adjoining portion of Greenbrier County. The Survey was unable to obtain the logs of Nos. 18 to 22, inclusive, and 24 on Map II, all located on a large boundary of several thousand acres owned by the Nuttall Heirs. In Water Well No. 23 on Map II, located on the east bank, 0.7 mile up Contrary Creek, tributary to Keeney Creek, the Sewell Coal is reported at a depth of 82 feet, with a thickness of 4 feet. The top of the hole has an elevation of 1860′ B., as determined by the author.

The following is the only detailed log that was obtained for any of the coal test borings in Nuttall District:

Brackens Creek Coal & Land Company Coal Test Boring No. 5 (Now 25 on Map II).

In Nuttall District, on Polly Skaggs farm, on north side of Brackens Creek on south side of road, 2.2 miles S. 75° W. from Russellville, completed January 23, 1913; authority, Brackens Creek Coal & Land Company and C. E. Krebs, elevation, 2134′ L.

	Thickness.		Total.		
	Ft.	In.	Ft.	In.	
Surface	16	8	16	8	
Shale	12	3	28	11	
Sandstone, **Guyandot**	44	3	73	2	
Slate	0	1	73	3	
Coal, Sewell "B"	0	9½	74	0½	74′ 0½″
Slate	0	4	74	4½	
Fire clay	2	3½	76	8	
Sandy shale	21	0	97	8	
Dark shale	21	0	118	8	
Sandy shale	14	6	133	2	
Dark shale	4	0	137	2	
Coal, Sewell "Rider"	0	9	137	11	
Bastard clay	2	0	139	11	
Dark shale	25	8	165	7	
Coal .... 1′ 9½″ } **Sewell**	2	2	167	9	93′ 8½″
Bone .... 0 4½ } (1966′ L.)					
Dark slate	0	10	168	7	
Sandstone, **Welch**	33	1	201	8	
Sandy shale	3	8	205	4	
Dark shale	15	2	220	6	
Coal, Welch	0	7½	221	1½	53′ 4½″
Shale	37	4½	258	6	
Sandstone, conglomerate, **Upper Raleigh**	47	6	306	0	84′ 10½″

The detailed log of the **Mrs. E. T. Martin Coal Test Boring — No. 26 on Map II** — located on the east side of Meadow River in the edge of Greenbrier County, just above Russellville, is published in Chapter IV in connection with the section for the latter place, pages 176-7.

BORING RECORDS, FAYETTEVILLE DISTRICT.

A total of 55 diamond-drill coal test borings have been sunk within the borders of Fayetteville District, as listed in the table on a preceding page of this Chapter. This table contains the only information that could be obtained from **Borings Nos. 33, 36A, 39, 40, 43, 44, 47-52, 54, 55, 57, 57A, 63, 64, 69-73, 78, and 79 on Map II.** The detailed logs of the others in this District, in addition to a dozen borings in the adjoining portion of Raleigh County, follow below:

Henry Light Coal Test Boring No. 5 (No. 28 on Map II).

In Fayetteville District, on west side of Wolf Creek, 1.5 miles S. 15° E. of Fayetteville; drilled by Hawkins Land Company; authority, C. E. Krebs; completed, July, 1903; elevation, 1805′ L.

		Thickness. Ft.	In.	Total. Ft.	In.	
Surface		1	8	1	8	
Sandstone, gray, flinty.. 74′ 1½″ Flint and sandstone .... 18 1 Sandstone, conglomerate, and fire clay. 24 10¾	**Lower Nuttall**	117	1¼	118	9¼	118′ 9¼″
Slate		13	0¾	131	10	
Sandstone, with seam of slate		6	0¾	137	10¾	
Sandstone		1	7¾	139	6½	
Slate, with seam of sandstone		5	1¾	144	8¼	
Sandstone		1	4¾	146	1	
Slate, with seam of sandstone		9	3	155	4	
Slate, with small sulphur balls		13	0¾	168	4¾	
Coal, Lower Iaeger		0	8¾	169	1½	50′ 4¼″
Slate		1	0½	170	2	

			Thickness.		Total.		
			Ft.	In.	Ft.	In.	
Sandstone	3′ 0½″	Harvey Conglomerate...	67	3½	237	5½	
Sandstone and slate	4 0½						
Sandstone	3 2½						
Slate and sandstone	30 0½						
Slate and seam of sandstone	17 2½						
Sandstone, with seam of slate	5 4½						
Slate and seam of sandstone	4 4½						
Slate			5	8½	243	2	
Slate, sandy			7	6½	250	8½	
Coal, Castle			1	3½	252	0	82′ 10½″
Slate, spots of fire clay			2	2½	254	2½	
Slate, sandy	3′ 9½″	**Guyandot**	42	10	297	0½	
Sandstone, seam of slate	5 2½						
Slate, sandy	33 10						
Coal, Sewell "B"			0	10½	297	11	45′ 11″
Slate, sandy			2	10½	300	9½	
Fire clay			0	7½	301	5	
Coal			0	2½	301	7½	
Fire clay			0	0½	301	8	
Slate			2	10½	304	6½	
Sandstone, seam of conglomerate			3	6½	308	1	
Sandstone and slate, mixed			12	7¾	320	8¾	
Sandstone, gray			2	0¾	322	9½	
Sandstone, gray and slate seams			6	8¾	329	6¼	
Slate			11	8¼	341	2½	
Coal, Sewell "A"			0	2	341	4½	
Slate			7	0	348	4½	
Sandstone with slate seams	4′ 0″	**Lower Guyandot**	36	9	385	1½	
Slate	3 0						
Sandstone and seam of slate	2 0						
Slate and seams of sandstone	27 9						
Coal, Sewell (1416′ L.)			4	1	389	2½	91′ 3½″
Slate, with little **coal** seams, to bottom			10	11	400	1½	10′ 11″

The above boring starts 10 feet below the top of the Lower Nuttall Sandstone, as determined by Teets, the great development of which has evidently cut away the Iaeger ("Hughes Ferry") Coal entirely.

The detailed log of the **Hawkins Land Company Boring—No. 29 on Map II**—located on the north bank of Marrs Branch, 2 miles from its mouth, at an elevation of 1650′ B., as determined by the author, is published in Chapter IV in connection with the Fayetteville—1.5 Miles Northwest Section, pages 183-4.

Core Test Boring—No. 30 on Map II.

In Fayetteville District, on south bank of Sugar Creek, 0.4 mile east from Laurel Creek, and 2¾ miles northwest of Fayetteville; by Keefer Coal Land Company; authority, C. E. Krebs; elevation, 1325' B.

	Thickness.		Total.		
	Ft.	In.	Ft.	In.	
Surface	17	5	17	5	
Shale	2	4	19	9	
Sandstone, crystallized, **Lower Nuttall**	92	9	112	6	112' 6'
Shale, dark, Upper Iaeger	39	6	152	0	
Coal, Lower Iaeger	0	3	152	3	
Sandstone, crystallized, **Harvey**	78	9	231	0	
Shale, sandy	36	0	267	0	
Sandstone and shale 13' 0" } **Guyandot**	26	2	293	2	
Sandstone 13 2					
Shale, dark	8	10	302	0	
Sandstone	1	0	303	0	
Sandstone, micaceous, with shale	10	2	313	2	
Shale, dark	13	3	326	5	
Sandstone, argillaceous	19	5	345	10	
Sandstone	0	7	346	5	
Shale, sandy	4	6	350	11	
Shale, brittle, black	4	11	355	10	
Bone 0' 5" } **Sewell**	1	9½	357	7½	245' 1½"
Coal 1 2					
Bone 0 2½					
Fire clay	1	4½	359	0	
Shale, brittle, black	2	3	361	3	
Shale, soft, black	2	5	363	8	
Sandstone, dark, argillaceous, **Welch**, to bottom	19	6	383	2	25' 6½"

The above boring starts 85 feet below the top of the Upper Nuttall Sandstone, as determined by the author. It is located one-fourth mile west of the western boundary line of minable Sewell Coal as the latter bed is limited on Figure 20 published on a subsequent page of this Chapter. This log and those of others in the immediate region constitute in a large measure the authority on which the line is drawn in this portion of the County.

Keefer Coal Land Company Coal Test Boring No. 2 (No. 31 on Map II).

In Fayetteville District, on east bank of Laurel Creek 1.8 miles south of Beckwith; authority, Keefer Coal Land Company and C. E. Krebs; elevation, 1285′ B.

	Thickness.		Total.		
	Ft.	In.	Ft.	In.	
Surface	15	7	15	7	
Sandstone, conglomeratic, **Lower Nuttall**	58	2	73	9	
Shale, with sandstone partings	19	11	93	8	
Shale, sandy...... 15′ 10″ Slate, rotten...... 2 0 **Upper Iaeger**	17	10	111	6	111′ 6″
Fire clay, **Hughes Ferry Coal horizon**	1	4	112	10	
Sandstone	2	8	115	6	
Shale, sandy	9	10	125	4	
Sandstone .... 56′ 2″ Shale, with sandstone partings.. 14 6 **Harvey Conglomerate**	70	8	196	0	
Shale, blue	11	0	207	0	
Shale, sandy	26	6	233	6	
Sandstone	4	6	238	0	
Shale, sandy	6	6	244	6	
Sandstone	0	8	245	2	
Shale, sandy	5	4	250	6	
Sandstone	6	4	256	10	
Shale, blue	0	4	257	2	
Sandstone, hard	4	10	262	0	
Slate, blue	4	6	266	6	
Shale, blue	13	10	280	4	
Shale, sandy	17	8	298	0	
Shale, black	3	10	301	10	
Shale, soft	0	7	302	5	
Shale, blue	0	6½	302	11½	
Sandstone	0	3	303	2½	
Fire clay	1	6	304	8½	
Sandstone	0	11	305	7½	
Sandstone, shaly	0	3	305	10½	
Sandstone	1	0	306	10½	
Sandstone, shaly	0	1	306	11½	
Sandstone	0	8	307	7½	
Shale	0	2	307	9½	
Sandstone	0	3	308	0½	
Shale, sandy	0	1½	308	2	
Sandstone, slate partings	3	7	311	9	
Slate, sandy	1	6	313	3	
Shale, sandy	3	10	317	1	
Sandstone	0	2½	317	3½	
Shale, soft	0	1½	317	5	
Sandstone	1	10	319	3	
Shale, sandy	25	11½	345	2½	
Shale, with sandstone partings	0	8	345	10½	
Shale, sandy, regular bedding	0	10	346	8½	
Sandstone, **coal partings, Sewell**	1	9	348	5½	236′ 11½″

	Thickness.		Total.		
	Ft.	In.	Ft.	In.	
Shale, sandy	4	0	352	5½	
Sandstone, argillaceous	11	5½	363	11	
Sandstone and shale	11	6	375	5	
Shale, sandy	3	2	378	7	
Shale, hard	2	6	381	1	
Shale, sandy	4	0	385	1	
Shale, soft	1	10	386	11	
Shale, soft, sandy	9	3	396	2	
Fire clay	0	3	396	5	
Shale	0	3	396	8	
Shale, sandy	19	0	415	8	
Sandstone, micaceous and shaly	5	2	420	10	72′ 4½″

The above boring starts 100 feet below the top of the Upper Nuttall Sandstone cliff, as determined by the author. The Sewell bed is represented by only some coal "spars" in a thin sandstone.

Keefer Coal Land Company Coal Test Boring No. 3 (No. 32 on Map II).

In Fayetteville District, on west bank of Laurel Creek, 0.3 mile north of Dempsey; authority, Keefer Coal Land Company and C. E. Krebs; elevation, 1320′ B.

	Thickness.		Total.		
	Ft.	In.	Ft.	In.	
Surface	16	0	16	0	
Sandstone, crystallized, **Lower Nuttall**	97	0	113	0	
Sandstone and shale	6	4	119	4	
Coal	0	1	119	5	
Sandstone and shale	13	3	132	8	
Shale	8	0	140	8	
Coal, "Hughes Ferry," Iaeger	0	4	141	0	141′ 0″
Fire clay	1	0	142	0	
Sandstone .... 31′ 0″ Sandstone and shale .... 48 4 } **Harvey Conglomerate**	79	4	221	4	
Shale	15	2	236	6	
Sandstone, **Guyandot**	45	0	281	6	
Shale, dark	6	5	287	11	
Sandstone	4	2	292	1	
Shale, with sandstone streaks, to bottom	139	7	431	8	290′ 8″

The above boring starts 105 feet below the top of the Upper Nuttall Sandstone, as determined by the author, and its log reveals the absence of the Sewell Coal bed which should belong at a depth of about 380 feet.

Evans Coal Test Boring No. 7 (No. 34 on Map II).

In Fayetteville District, on head of Laurel Creek, 1 mile above mouth of Sugar Branch, on south side of road, and 2 miles S. 70° W. from Fayetteville; by Hawkins Land Company, authority, with C. E. Krebs; completed, March, 1904; elevation, 1630' L.

				Thickness.		Total.		
				Ft.	In.	Ft.	In.	
Surface				14	2	14	2	
Sandstone, gray	0'	8"	**Upper Nuttall**	26	10	41	0	
Sand	0	4						
Sand, wash	3	0						
Sandstone, gray	18	10						
Slate	2	2						
Sandstone, gray	1	10						
Coal, Iaeger "B"				0	2	41	2	
Sandstone, gray, **Lower Nuttall**				88	4	129	6	
Slate, with seams of coal (**"Hughes Ferry") Iaeger**				5	1	134	7	134' 7"
Slate				21	5½	156	0½	
Sandstone, gray				5	4½	161	5	
Slate and sandstone				6	5½	167	10½	
Slate				16	1½	184	0	
Slate and sandstone				6	0½	190	0½	
Sandstone, gray	5'	3½"	**Harvey**	34	4½	224	5	
Sandstone and slate	18	8½						
Sandstone, gray	7	8						
Sandstone and slate	1	5						
Sandstone, slate, and fire clay	1	3½						
Sandstone, gray, **Guyandot**				44	9½	269	2½	
Slate				0	5½	269	8	
Fire clay				4	8	274	4	
Slate				20	9	295	1	
Slate, fire clay, and sandstone				8	6	303	7	
Fire clay, **horizon of Sewell "B" Coal**				2	10	306	5	71' 10"
Slate and sandstone				3	3	309	8	
Sandstone, gray				1	10	311	6	
Slate				2	10	314	4	
Slate and sandstone				14	6½	328	10½	
Coal, Sewell "A"				0	10	329	8½	23' 3½'
Sandstone and slate	9'	10"	**Lower Guyandot.**	45	0	374	8½	
Sandstone, gray	1	3						
Slate and sandstone	10	4						
Slate, sandy	2	7						
Sandstone, gray	18	6						
Slate	1	8						
Sandstone, gray	0	10						
Shale and sandstone				4	7	379	3½	
Slate, **Hartridge**				12	6,	391	9½	

			Thickness. Ft.	In.	Total. Ft.	In.	
Coal (1235′ L.)......	3′ 6″	Sewell	5	6	397	3½	67′ 7″
Slate, with seams of coal	2 0						
Slate and sandstone, to bottom...			10	8	407	11½	10′ 8″

The above boring, as determined by Teets, starts 20 feet below the top of the Upper Nuttall Sandstone.

Loup Creek Colliery Company Coal Test Boring No. 2 (No. 35 on Map II).

In Fayetteville District, near church, mouth of Carter Branch of Loop Creek at Wriston; authority, W. H. Evans of same company; completed, May, 1906; elevation, 1406′ L.

			Thickness. Ft.	In.	Total. Ft.	In.	
Sandstone and boulders..........			12	0	12	0	
Sandstone, soft, gray	5′ 0″	Lower Nuttall	80	0	92	0	92′ 0″
Sandstone, hard, white	70 0						
Sandstone, soft, gray	1 0						
Sandstone, hard, white	4 0						
Slate, black, **Upper Iaeger**........			14	0	106	0	
Sandstone, soft, gray.............			33	0	139	0	
Slate, dark......................			3	0	142	0	
Sandstone, hard, gray............			2	6	144	6	
Coal, Lower Iaeger...............			0	6	145	0	53′ 0″
Sandstone, dark, micaceous......			28	0	173	0	
Slate, sandy, dark...............			49	0	222	0	
Sandstone, gray.................			3	0	225	0	
Slate, sandy, dark...............			21	9	246	9	
Black slate and coal parting, **Sewell "B"**....................			0	10	247	7	102′ 7″
Slate, dark......................			22	2	269	9	
Coal, slaty, **Sewell "A"**...........			0	3	270	0	22′ 5″
Slate, dark......................			17	0	287	0	
Sandstone, gray, **Lower Guyandot**			25	0	312	0	
Slate, dark, **Sewell Coal** horizon..			78	0	390	0	
Sandstone, gray.................			11	0	401	0	
Conglomerate			6	0	407	0	
Slate, dark......................			6	0	413	0	
Conglomerate			1	0	414	0	
Sandstone, hard, white	79′ 0″	Upper and Lower Raleigh	173	0	587	0	
Conglomerate	2 0						
Sandstone, gray...	61 0						
Slate, black.......	9 0						
Sandstone, hard, white	22 0						

	Thickness.		Total.		
	Ft.	In.	Ft.	In.	
Coal .... 1' 2" **Coal, slaty**........ 0 10 } **Beckley**	2	0	589	0	319' 0"
Slate, dark......................	21	0	610	0	
Sandstone, white, **Quinnimont**, to bottom	57	0	667	0	78' 0"

The above boring, as determined by the author, starts 100 feet below the top of the Upper Nuttall Sandstone which forms here a prominent cliff along the Virginian Railway grade. The Sewell Coal is absent, but it should belong at 340 to 350 feet in depth.

Hawkins Land Company Coal Test Boring No. 1 (No. 36 on Map II).

In Fayetteville District, on northeast bank of Loop Creek, 1.3 miles southeast of Wriston; by Hawkins Land Company, authority, with C. E. Krebs; completed in November, 1901; elevation, 1590' B.

	Thickness.		Total.		
	Ft.	In.	Ft.	In.	
Boulders and sand...............	13	7	13	7	
Sandstone, gray, **Lower Nuttall**...	98	5	112	0	
Conglomerate and fire clay.......	5	2	117	2	
Coal, "Hughes Ferry," Iaeger.....	0	6	117	8	117' 8"
Conglomerate and fire clay.......	6	2	123	10	
Sandstone, gray.................	18	11	142	9	
Fire clay........................	3	11	146	8	
Sandstone, gray ..... 25' 5" Sandstone, gray ..... 37 6 } **Harvey Conglomerate**	62	11	209	7	
Slate, seam of sandstone.........	5	6	215	1	
Slate	11	11	227	0	
Sandstone and slate..............	6	0	233	0	
Slate and fire clay, **Castle Coal horizon**	10	0	243	0	125' 4"
Sandstone, streak of slate....... 56' 8" Sandstone, gray. 38 6 } **Guyandot**	95	2	338	2	
Coal, Sewell "A".................	0	2	338	4	
Sandstone, gray, **Lower Guyandot**.	8	2	346	6	
Sand, slate, and sandstone........	2	10	349	4	
Coal, Sewell.....................	4	4	353	8	110' 8"
Slate	10	10	364	6	
Sandstone and slate. .... 4' 9" Sandstone, gray... 45 3 Slate .... 17 4 Sandstone and slate .... 11 3 } **Upper Raleigh**	78	7	443	1	
Fire clay and slate..............	11	8	454	9	

		Thickness. Ft.	In.	Total. Ft.	In	
Sandstone, gray 37′ 5″	Lower Raleigh	78	0	532	9	
Sandstone, gray, and pea conglomerate 34 9						
Sandstone, seams of coal and fire clay 5 10						
Slate		8	0	540	9	
Coal, Beckley....................		4	2	544	11	191′ 3″
Slate and fire clay, to bottom.....		6	3	551	2	6′ 3″

The above boring, as determined by the author, starts 65 feet below the top of the Upper Nuttall Sandstone. This log and the one next below show a local thickening of what appears to be the Beckley Coal. Away from this immediate region the latter bed is thin and unimportant.

Collins Coal Test Boring (No. 37 on Map II).

In Fayetteville District, at Mine No. 144 on Map II, 0.3 mile north of Summerlee (formerly Parral); by Stuart Colliery Company; elevation, 1995′ L.

	Thickness. Ft.	In.	Total. Ft.	In.	
Surface	7	9	7	9	
Sandstone	32	0	39	9	
Slate	1	6	41	2	
Coal, Lower Douglas.............	0	6	41	8	41′ 8″
Slate	8	6	50	2	
Sandstone, white, **Upper Nuttall**..	43	0	93	2	
Slate, black, soft.................	23	0	116	2	
Sandstone, glassy, conglomeratic, **Lower Nuttall**..................	122	0	238	2	196′ 6″
Shale, black, sandy..............	119	0	357	2	
Sandstone, gray, conglomeratic, **Harvey**	11	0	368	2	
Slate, black......................	2	0	370	2	
Coal, bony, Castle...............	3	0	373	2	135′ 0″
Shale, dark, sandy................	9	0	382	2	
Sandstone, gray, conglomeratic...	16	0	398	2	
Sandy beds, dark, hard...........	33	0	431	2	
Sandstone, coarse................	34	0	465	2	
Sandstone, dark..................	11	0	476	2	
Sandstone, gray..................	2	0	478	2	
Coal, bone, Sewell "B"..........	0	2	478	4	105′ 2″
Fire clay........................	6	0	484	4	
Sandstone, coarse................	36	0	520	4	
Sandstone, dark, hard nuggets....	5	0	525	4	
Coal, Sewell? (1468.5′ L.)........	1	3	526	7	48′ 3″
Fire clay........................	0	6	527	1	
Slate, black, soft...............	8	0	535	1	

	Thickness. Ft.	In.	Total. Ft.	In.	
Shale, dark, sandy	45	0	580	1	
Sandstone, gray, hard, **Upper Raleigh**	96	0	676	1	
Shale, gray, not hard	12	0	688	1	
Shale, dark-gray	14	0	702	1	
Sandstone, dark	18	0	720	1	
Shale and sandstone	12	0	732	1	
Slate	0	6	732	7	
Coal, Beckley	3	4	735	11	209′ 4″

The above log is on the authority of I. C. White as published on pages 38-9 of Volume II(A) of the State Geological Survey Reports. There is an apparent discrepancy in the log as published in the volume last mentioned, since the elevation of the Sewell Coal in **Shaft Mine No. 144 on Map II,** 150 feet westward, is only 1345′ L. This is further corroborated by the log of the **Hawkins Land Company Boring—No. 38 on Map II,** 300 to 400 yards northeastward, the details of which are published in Chapter IV in connection with the Parral Section, pages 186-7.

The two following logs, with some slight modifications, are as published in Volume II(A) of the State Survey Reports, pages 34 and 32-3, respectively:

New River Collieries Company Coal Test Boring No. 68 (No. 41 on Map II).

In Fayetteville District, on west bank of Coal Run, 1.2 miles N. 55° W. of Brooklyn (Finlow P. O.); elevation, 1620′ L.

			Thickness. Ft.	In.	Total. Ft.	In.	
Surface			10	0	10	0	
Sandstone	45′ 0″	**Upper Raleigh**	70	3	80	3	
Shale, dark	5 0						
Sandstone	4 0						
Shale, dark	13 7						
Sandstone	2 8						
Shale, dark			17	6	97	9	
Coal	0′ 6″	**Little Raleigh**	2	7	100	4	100′ 4″
Slate	0 5						
Coal and slate	0 10						
Slate	0 6						
Coal, bony	0 4						
Fire clay, bastard			1	10	102	2	
Sandstone	7′ 6″	**Lower Raleigh**	63	6	165	8	
Sandstone, very hard	56 0						
Shale, dark			66	0	231	8	

	Thickness.		Total.		
	Ft.	In.	Ft.	In.	
Shale, light	13	3	244	11	
Sandstone	4	6	249	5	
Shale, light	0	6	249	11	
Sandstone	2	0	251	11	
Shale, light	1	3	253	2	
Sandstone	1	0	254	2	
Shale, light	2	0	256	2	
Sandstone	11	0	267	2	
Slate, gray	3	11	271	1	
Coal, Fire Creek	1	5	272	6	172′ 2″
Fire clay	6	1	278	7	
Slate, gray	11	0	289	7	
Slate, dark	0	6	290	1	
Coal, bone, "split" from Fire Creek	0	4	290	5	
Shale, light	7	3	297	8	
Sandstone	13	4	311	0	
Shale, dark, to bottom	13	5	324	5	51′ 11″

The above boring starts 75 to 80 feet below the Sewell Coal.

New River Collieries Company Coal Test Boring No. 67 (No. 42 on Map II).

In Fayetteville District, on west bank of Coal Run, 1.0 mile N. 70° W. of Finlow P. O. (Brooklyn); elevation, 2050.5′ L.

	Thickness.		Total.		
	Ft.	In.	Ft.	In.	
Surface	13	0	13	0	
Sandstone	22	0	35	0	
Slate, dark	2	6	37	6	
Coal, "Hughes Ferry," Iaeger	0	11	38	5	38′ 5″
Fire clay, bastard	1	6	39	11	
Sandstone	9	0	48	11	
Slate, dark	47	6	96	5	
Sandstone	12	0	108	5	
Shale, dark	5	0	113	5	
Sandstone	7	0	120	5	
Shale, dark	13	1	133	6	
Coal, Castle	1	0	134	6	96′ 1″
Fire clay, bastard	1	6	136	0	
Shale and sandstone	40	0	176	0	
Shale, dark	5	0	181	0	
Coal, Sewell "B"	0	10	181	10	47′ 4″
Fire clay	7	5	189	3	
Shale, light	13	0	202	3	
Sandstone	14	6	216	9	
Shale and sandstone	16	0	232	9	
Sandstone, **Lower Guyandot**	36	9	269	6	
Slate, gray	8	0	277	6	
Coal, Sewell	4	3	281	9	99′ 11″
Slate, dark, and **coal** streaked	2	6	28[illegible]	[illegible]	

	Thickness.		Total.		
	Ft.	In.	Ft.	In.	
Shale, dark	11	3	295	6	
Coal, "split" from Sewell	0	8	296	2	
Shale, dark	37	0	333	2	
Fire clay, bastard	17	4	350	6	
Sandstone	2	0	352	6	
Fire clay, bastard	1	3	353	9	
Sandstone, very hard, **Upper Raleigh**	89	1	442	10	
Slate, dark	2	6	445	4	
Coal, Little Raleigh	0	6	445	10	164′ 1″
Shale, light	22	0	467	10	
Sandstone	3	9	471	7	
Shale, light	1	6	473	1	
Sandstone	1	0	474	1	
Shale, light	14	2	488	3	
Slate, dark	3	4	491	7	
Coal 0′ 6″ Slate, dark 0 8 **Coal** 1 4 — **Beckley**	2	6	494	1	48′ 3″
Shale, dark	2	8	496	9	
Sandstone	4	0	500	9	
Shale, gray	5	9	506	6	
Coal, "split" from Beckley	1	0	507	6	13′ 5″
Fire clay, bastard	0	6	508	0	
Sandstone	9	6	517	6	
Shale, dark	34	0	551	6	
Slate, dark	8	0	559	6	
Sandstone	2	2	561	8	
Shale, dark	1	9	563	5	
Shale, gray	35	7	599	0	
Slate, dark	1	0	600	0	
Coal, Fire Creek	5	5	605	5	97′ 11″
Fire clay	2	7	608	0	2′ 7″

The two following boring records are, with some slight changes in correlation, as published in Volume II(A) of the State Survey Reports, pages 35-6 and 36-37, respectively:

New River Collieries Company Coal Test Boring No. 65 (No. 45 on Map II).

In Fayetteville District, on waters of Rush Run, 1 mile due north of Rush Run Station; elevation, 1852′ L.

	Thickness.		Total.		
	Ft.	In.	Ft.	In.	
Surface	30	0	30	0	
Shale, dark	24	0	54	0	
Slate	0	8	54	8	
Bone	0	4	55	0	
Coal, Sewell "B"	1	2	56	2	56′ 2″
Fire clay, bastard	1	0	57	2	
Sandstone, **Lower Guyandot**	66	0	123	2	

	Thickness.		Total.		
	Ft.	In.	Ft.	In.	
Slate, gray	6	6	129	8	
Coal, Sewell	4	2	133	10	77′ 8″
Fire clay, bastard	4	6	138	4	
Shale, dark	59	0	197	4	
Sandstone, hard...53′ 8″ Shale, dark......... 8 0 Sandstone, hard...17 8 } **Upper Raleigh**	79	4	276	8	
Shale, hard	6	0	282	8	
Coal, Little Raleigh	0	2	282	10	149′ 0″
Fire clay, bastard	6	0	288	10	
Shale, dark	6	0	294	10	
Sandstone	8	0	302	10	
Shale, dark	24	2	327	0	
Coal, Beckley "Rider"	1	4	328	4	45′ 6″
Fire clay, bastard	2	8	331	0	
Sandstone, hard	30	6	361	6	
Coal, Beckley	1	10	362	4	34′ 0″
Shale, dark	0	8	363	0	
Sandstone	4	5	367	5	
Shale, dark	13	10	381	3	
Sandstone	3	2	384	5	
Shale, dark	22	8	407	1	
Shale and sandstone	24	0	431	1	
Slate, gray	2	5	433	6	
Coal, Fire Creek	3	5	436	11	74′ 7″
Fire clay, bastard	5	0	441	11	
Shale, gray	19	7	461	6	
Coal, Little Fire Creek	1	0	462	6	25′ 7″
Fire clay, bastard, to bottom	2	6	465	0	2′ 6″

New River Collieries Company Coal Test Boring No. 66 (No. 46 on Map II).

In Fayetteville District, in head of branch of Rush Run, 1.5 miles due north of Rush Run Station; elevation, 1945′ B.

	Thickness.		Total.		
	Ft.	In.	Ft.	In.	
Surface	33	0	33	0	
Shale, dark	33	0	66	0	
Sandstone	8	0	74	0	
Shale, dark	2	0	76	0	
Sandstone	1	0	77	0	
Shale, dark	1	6	78	6	
Sandstone	2	0	80	6	
Shale, dark	24	0	104	6	
Sandstone	1	0	105	6	
Coal, Castle	1	1	106	7	106′ 7″
Fire clay, bastard	1	6	108	1	
Sandstone	21	0	129	1	
Sandstone and shale	19	6	148	7	
Shale, dark	5	7	154	2	
Coal, Sewell "B"	0	6	154	8	48′ 1″
Fire clay, bastard	3	9	158	5	

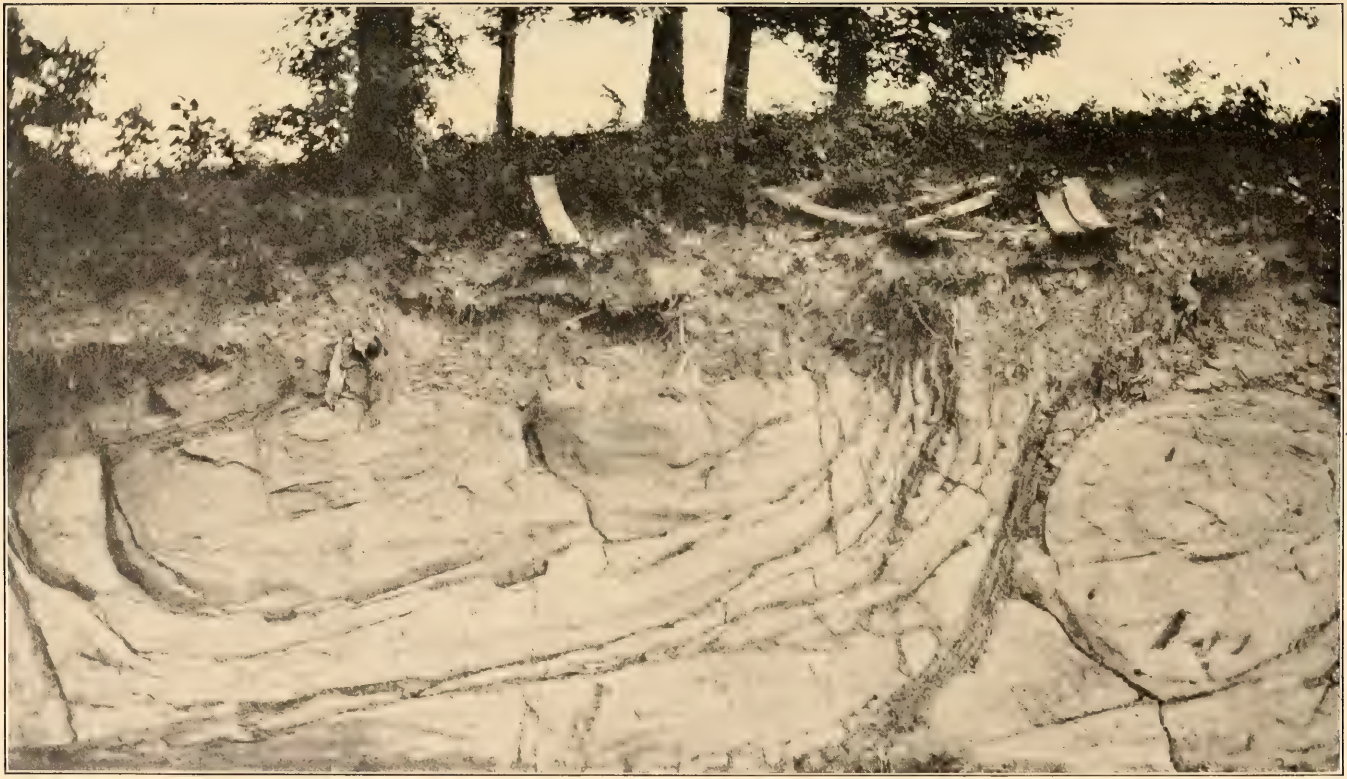


PLATE XIV.—View showing concentric iron bands inclosing concretionary masses in the Dotson Sandstone in west edge of Fayetteville, characteristic of this ledge in Fayette and Raleigh Counties.

	Thickness.		Total.		
	Ft.	In.	Ft.	In.	
Sandstone, shaly	51	0	209	5	
Sandstone	25	8	235	1	
Slate, gray	5	8	240	9	
Coal, Sewell	4	2	244	11	90′ 3″
Fire clay, bastard	7	3	252	2	
Shale, dark	65	5	317	7	
Coal, "Welch"	0	4	317	11	73′ 0″
Shale, dark	30	0	347	11	
Sandstone, hard, **Upper Raleigh**	35	0	382	11	
Shale, dark	59	6	442	5	
Coal and bone, Beckley "Rider"	1	6	443	11	126′ 0″
Fire clay, bastard	4	3	448	2	
Sandstone	2	3	450	5	
Shale, dark	9	10	460	3	
Sandstone	0	1	460	4	
Coal, Beckley	0	6	460	10	16′ 11″
Fire clay, bastard	1	0	461	10	
Sandstone	10	10	472	8	
Sandstone and shale	6	6	479	2	
Shale, dark	54	11	534	1	
Fire clay	10	0	544	1	
Shale and sandstone	10	0	554	1	
Sandstone	30	0	584	1	
Shale, dark	3	0	587	1	
Slate, dark	5	2	592	3	
Coal, Fire Creek	0	4	592	7	131′ 9″
Fire clay	7	6	600	1	
Shale and sandstone	2	0	602	1	
Slate, dark	1	2	603	3	
Coal, Little Fire Creek	0	6	603	9	11′ 2″
Fire clay, bastard	2	0	605	9	
Shale, dark	2	0	607	9	
Sandstone, gray	15	6	623	3	19′ 6″

Coal Test Boring Record—No. 53 on Map II.

In Fayetteville District, on north bank of Mossy Creek, ⅛ mile northwest of Toney School and 1.5 miles northwest of Carlisle; No. 6 on Mossy Coal & Land Company; drilled by Birdsboro Steel & Foundry Company in February, 1904, and log duly attested by oath; authority for log, R. T. Hubard, Jr.; elevation, 1725′ B.

	Thickness.		Total.		
	Ft.	In.	Ft.	In.	
Surface	11	10	11	10	
Gray substance	44	7	56	5	56′ 5″
Flint rock.......20′ 0 ″ Gray sandstone..33 9½ Black slate......21 3 Gray sandstone..18 5 Gray sandstone.. 3 2½ **Lower Nuttall**	96	8	153	1	
Slate	16	4	169	5	
Coal, "Hughes Ferry," Iaeger	0	9½	170	2½	113′ 9½″
Sandstone, seams of slate	5	0	175	2½	
Gray sandstone, **Harvey Conglomerate**	76	2	251	4½	

		Thickness.		Total.		
		Ft.	In.	Ft.	In	
Slate		1	8½	253	1	
Coal, Castle		0	4	253	5	83 2½″
Slate		3	0	256	5	
Gray sandstone 12′ 8½″ Slate and sandstone 30 9 Slate 9 3 Slate and sandstone 5 6½ Gray sandstone. 5 0 Slate and sandstone 8 0	**Guyandot**	71	3	327	8	
Slate		13	7	341	3	
Sandstone 2′ 0″ Sandstone, seams of slate 2 0 Sandstone 39 5	**Lower Guyandot**	43	5	384	8	
Slate, **Hartridge**		9	1	393	9	
Coal 5′ 3 ″ Slate 0 10½ **Bony coal** 2 2 **Coal** 0 4	**Sewell** (1323′ B.)	8	7½	402	4½	148′ 11½″
Slate		12	3½	414	8	
Slate and seams of sandstone		9	9	424	5	
Slate		10	5	434	10	
Slate and seams of sandstone		10	8	445	6	
Slate		6	0	451	6	
Sandstone, seams of **coal** 24′ 6″ Sandstone 21 10 Sandstone, spots of conglomerate 20 3	**Upper Raleigh**	66	7	518	1	
Sandstone, spots of fire clay		31	0	539	1	
Bastard flint, spots of conglomerate. 14′ 0″ Sandstone, spots of conglomerate 6 3 Bastard flint 11 9 Sandstone, seams of conglomerate 23 8 Sandstone 6 0 Slate 0 8 Sandstone 4 8	**Lower Raleigh**	67	0	606	1	
Sandy slate		5	10	611	11	
Fire clay, **Beckley Coal horizon**		0	5	612	4	
Slate, with spots of fire clay		50	4	662	8	
Slate and sandstone		47	8	710	4	
Slate		3	3	713	7	311′ 2½″
Fire clay, **Fire Creek Coal** horizon at top		3	0	716	7	
Slate and sandstone		5	6	722	1	
Sandstone		4	8	726	9	
Slate		0	5	727	2	
Gray sandstone		37	6	764	8	

	Thickness.		Total.		
	Ft.	In.	Ft.	In.	
Slate	1	8½	766	4½	
Sandstone and slate	1	1½	767	6	
Gray sandstone, spots of fire clay	2	0	769	6	
Sandstone, spots of conglomerate	20	10	790	4	
Slate, seams of sandstone	16	6	806	10	
Gray sandstone, to bottom	6	0	812	10	99′ 3″

Painter Coal Test Boring No. 1 (No. 56 on Map II).

In Fayetteville District, on east side of the Virginian Railway; ¾ mile northeast of Lively Station; authority, Plum Orchard Coal and Land Company; elevation, 1649′ L.

	Thickness.		Total.		
	Ft.	In.	Ft.	In.	
Sandstone, **Lower Nuttall**	83	0	83	0	
Shale, sandy	26	0	109	0	
Shale, dark	5	0	114	0	
Coal, Iaeger, "Hughes Ferry"	1	0	115	0	115′ 0″
Sandstone and shale	58	0	173	0	
Sandstone, hard, **Harvey Conglomerate**	42	0	215	0	
Sandstone and shale	38	0	253	0	
Shale, dark, **coal at base**	14	0	267	0	
Sandstone, hard, **Guyandot**	65	0	332	0	
Sandstone and shale	30	0	362	0	
Coal, Sewell	3	2	365	2	250′ 2″
Shale, gray	7	10	373	0	
Sandstone, hard, **Upper Raleigh**	80	0	453	0	
Sandstone and shale	56	0	509	0	
Sandstone, **Lower Raleigh**, layers of 14″ to 30″, bottom of ledges composed of shale, sulphur, and sand conglomerate	86	6	595	6	
Sandstone, hard	47	6	643	0	
Sandstone, hard, sulphur	27	0	670	0	
Sandstone, hard	84	0	754	0	
Sandstone, conglomerate	8	0	762	0	
Sandstone, showing of coal	10	0	772	0	406′ 10″
Sandstone	35	0	807	0	
Shale, dark	2	0	809	0	
Sandstone	9	0	818	0	
Shale, dark	10	0	828	0	
Sandstone	13	0	841	0	
Shale	3	0	844	0	
Sandstone and shale	12	0	856	0	
Sandstone	10	0	866	0	
Shale, dark	6	0	872	0	
Sandstone	2	0	874	0	
Shale, dark	8	0	882	0	
Sandstone, hard, **base of Pottsville**	3	0	885	0	113′ 0″
Shale, red and green	10	0	895	0	
Sandstone and shale	105	0	1000	0	
Sandstone and shale	17	8	1017	8	

	Thickness. Ft.	In.	Total. Ft.	In.	
Sandstone, hard	26	4	1044	0	
Sandstone, light, dark	8	0	1052	0	167′ 0″
Sandstone, dark, Princeton Conglomerate	67	0	1119	0	
Sandstone and shale	11	0	1130	0	
Shale, dark	75	0	1205	0	
Sandstone, to bottom	10	0	1215	0	163′ 0″

The above record, with some slight changes, is as published on page 307 of the Raleigh County Report and page 41 of Volume II(A). In the column headed "Lively—1 Mile N. E." in the Sewell Coal Table of Intervals, published in Chapter III, page 89, it was used for results indicated. The boring starts 10 feet below the top of the Lower Nuttall Sandstone, as determined by the author.

Deal Coal Test Boring No. 1 (No. 58 on Map II).

In Fayetteville District; on northeast bank of Horse Creek, branch of Paint Creek, 1.4 miles southeast of Lively; elevation, 1700′ B.

	Thickness. Ft.	In.	Total. Ft.	In.	
Soil and boulders	10	0	10	0	
Sandstone, dark	2	1¾	12	1¾	
Coal "Hughes Ferry," Iaeger	0	9	12	10¾	12′ 10¾″
Sandstone, dark	15	3¼	28	2	
Sandstone	18	10	47	0	
Sandstone and shale	27	2	74	2	
Shale, sandy	15	1	89	3	
Sandstone, **Harvey Conglomerate**	64	0	153	3	
Sandstone and shale	19	9	173	0	
Shale	4	6	177	6	
Sandstone and shale	18	6	196	0	
Sandstone, **Guyandot**	30	7	226	7	
Shale	2	3	228	10	
Coal, Sewell "B"	1	3	230	1	217′ 2¼″
Shale, sandy	6	6	236	7	
Sandstone and shale	13	6	250	1	
Shale, dark	36	11	287	0	
Coal, Sewell, impure	2	5	289	5	59′ 4″
Shale, soft	16	9½	306	2½	
Coal, Sewell "Split"	0	4½	306	7	
Shale	2	5	309	0	
Sandstone, **Welch**	18	0	327	0	
Sandstone and shale	31	8	358	8	
Shale, sandy	1	4	360	0	
Sandstone, hard...60′ 0″ Sandstone, conglomerate ......17 11 } **Upper Raleigh**	77	11	437	11	
Sandstone and shale	6	5	444	4	

	Thickness.		Total.		
	Ft.	In.	Ft.	In.	
Shale, sandy	14	1	458	5	
Coal, Little Raleigh	0	6	458	11	169′ 6″
Shale, dark	10	10	469	9	
Sandstone and shale	7	3	477	0	
Sandstone, hard. 129′ 2″ Sandstone, conglomerate .... 10 6 Sandstone, shale 10 4 } **Lower Raleigh and Quinnimont**	150	0	627	0	
Sandstone, shale	5	3	632	3	
Shale	17	3	649	6	
Coal, Fire Creek	0	4	649	10	190′ 11″
Shale	31	2	681	0	
Sandstone and shale	23	10	704	10	
Coal, No. 9 Pocahontas, trace					
Shale	12	1	716	11	67′ 1″
Sandstone	4	6	721	5	
Sandstone and shale	15	10	737	3	
Sandstone	48	1	785	4	
Sandstone and shale	8	8	794	0	
Shale, dark, (2″ **coal**)	3	0	797	0	
Sandstone	6	7	803	7	
Sandstone, dark	3	3	806	10	
Shale, dark	15	4	822	2	
Shale, white, sandy, **base of Pottsville**	16	4	838	6	121′ 7″
Shale, red and green	82	9	921	3	
Sandstone, to bottom	33	1	954	4	115′ 10″

The above record, with some changes and additions, is as published on pages 42-3 and 305-6, respectively, of Volume II(A) and the Raleigh County Report of the State Survey.

Plum Orchard Coal & Land Company Coal Test Boring (No. 60 on Map II).

In Fayetteville District, on east bank of Willis Branch, on Burges farm, ¾ mile N. 70° W. of Paintsville; elevation, 1685′ B.

	Thickness.		Total.		
	Ft.	In.	Ft.	In.	
Soil and boulders	6	6	6	6	
Sandstone ......72′ 6″ Shale .... 1 2 Sandstone ......16 10 } **Lower Nuttall**	90	6	97	0	97′ 0″
Sandstone and shale	37	6	134	6	
Sandstone, dark	2	10	137	4	
Sandstone, light	1	8	139	0	
Sandstone and shale	26	0	165	0	
Sandstone, brown	1	6	166	6	
Shale	14	0	180	6	
Sandstone and shale	12	0	192	6	
Sandstone	53	0	245	6	
Shale	4	6	250	0	

	Thickness.		Total.		
	Ft.	In.	Ft.	In.	
Sandstone and shale..............	5	8	255	8	
Sandstone	5	6	261	2	
Shale, dark.......................	8	10	270	0	
Coal, Castle....................	0	5½	270	5½	173′ 5½″
Shale	4	6½	275	0	
Sandstone, **Guyandot**.............	48	11	323	11	
Shale, dark.......................	17	6	341	5	
Sandstone	3	6	344	11	
Sandstone and shale..............	20	1	365	0	
Shale, dark.......................	23	6	388	6	
Coal, Sewell "Rider".............	0	8	389	2	
Shale, dark.......................	16	4	405	6	
Coal, impure, Sewell.............	3	8	409	2	138′ 8½″
Shale, dark.......................	1	10	411	0	
Sandstone	34	0	445	0	35′ 10″

The above record, with slight changes, is as published on pages 120-1 of the Raleigh County Report.

E. J. Berwind Core Test No. 4 (No. 61 on Map II).

In Fayetteville District, on south bank of Boyd Branch, 1.0 mile northeast of Cirtsville; authority; J. S. Cunningham; completed, June 2, 1909; elevation, 1897′ L.

	Thickness.		Total.		
	Ft.	In.	Ft.	In.	
Surface	22	0	22	0	
Sandstone, **Lower Nuttall**.........	41	0	63	0	
Shale, dark.... 15′ 0″ Slate, black... 23 0 **Upper Iaeger**	38	0	101	0	101′ 0″
Sandstone, **Middle Iaeger**.........	41	0	142	0	
Shale	7	6	149	6	
Shale, **coal flakes, Lower Iaeger**..	2	0	151	6	50′ 6″
Shale	1	0	152	6	
Sandstone, hard.. 41′ 6″ Shale .... 2 0 Rock, hard...... 53 0 **Harvey Conglomerate**	96	6	249	0	
Shale with sandstone partings...	73	0	322	0	
Coal, Sewell "B".................	0	3	322	3	170′ 9″
Fire clay.........................	4	4	326	7	
Sandstone, **Lower Guyandot**......	46	5	373	0	
Shale, dark..... 16′ 6″ Slate, black..... 13 6 **Hartridge**	30	0	403	0	
Coal .... 0′ 1″ Bone .... 0 1 **Coal** .... 0 5 **Coal and bone**....0 10 **Coal** ....4 11 **Sewell**...	6	4	409	4	87′ 1″
Slate to bottom...................	2	0	411	4	2′ 0″

The above record, with the addition of several names for members, is as published on page 202 of the Raleigh County Report.

The detailed log of the **E. J. Berwind No. 25 Coal Test Boring—No. 62 on Map II**—located just southeast of the Weirwood Shaft Mine—No. 174 on Map II, 0.3 mile northeast of Herberton, is published in Chapter IV in connection with the section for the latter place, page 195.

McKinley Land Company Coal Test Boring No. 2 (No. 65 on Map II).

In Fayetteville District, on north bank of Boyd Branch, on O'Neil farm, 0.6 mile southeast from Herberton, (Willis Branch P. O.); completed in 1907; authority, J. B. Laing; elevation, 1732.52' L.

	Thickness.		Total.		
	Ft.	In.	Ft.	In.	
Casing	8	0	8	0	
Sandstone, very hard	29	6	37	6	
Sandstone, shale partings	11	3	48	9	
Shale, sandstone partings	3	4	52	1	
Sandstone, very hard, **Harvey Conglomerate**	90	0	142	1	
Shale, blue	7	0	149	1	
Sandstone, shale parting ...... 10' 0" Shale, sandstone partings .... 43 0 **Guyandot.**	53	0	202	1	
Shale, dark	17	0	219	1	
Coal, Sewell "B"	0	8	219	9	219' 9"
Fire clay	0	1	219	10	
Sandstone, very hard, **Lower Guyandot**	19	10	239	8	
Shale, dark.... 37' 0" Slate, black.... 5 0 **Hartridge.**	42	0	281	8	
Bone.......... 0' 2" **Coal**........... 4 1 **Sewell**	4	3	285	11	66' 2"
Shale, blue	20	3	306	2	
Bone	3	8	309	10	
Shale, dark	1	4	311	2	
Sandstone, very hard, to bottom	5	10	317	0	31' 1"

The above record, with the addition of some names for members, is as published on page 308 of the Raleigh County Report.

E. J. Berwind Coal Test Boring No. B-16 (No. 66 on Map II).

In Fayetteville District, on Boyd Branch near the Fayette-Raleigh County Line; 1.1 miles southeast of Herberton (Willis Branch P. O.); authority, J. S. Cunningham; completed, July 25, 1913; elevation, 1771.72′ L.

	Thickness.		Total.		
	Ft.	In.	Ft.	In.	
Surface	20	0	20	0	
Sandstone, hard	30	0	50	0	
Slate	8	0	58	0	
Fire clay	4	0	62	0	
Sandstone, very hard, **Harvey**	103	0	165	0	
Shale, dark, sandy	31	0	196	0	
Sandstone, **Guyandot**	23	0	219	0	
Shale, dark	30	0	249	0	
Slate, black	14	0	263	0	
Sandstone	7	0	270	0	
Shale, dark	26	0	296	0	
Slate, black	4	0	300	0	
Slate, with coal spars	0	4	300	4	
Coal, Sewell	4	7	304	11	304′ 11″
Fire clay	2	1	307	0	
Shale, dark	10	0	317	0	
Sandstone, hard, **Welch**	24	0	341	0	
Shale, dark	33	0	374	0	
Sandstone, very hard, **Upper Raleigh**	82	0	456	0	
Coal, Little Raleigh	0	6	456	6	151′ 7″
Shale, dark	6	6	463	0	
Shale, gray	16	0	479	0	
Sandstone	5	0	484	0	
Shale, sandy, dark. 8′ 0″ Sandstone 25 0 Sandstone, conglomerate 27 0 Sandstone 2 0 Sandstone, conglomerate 6 0 Sandstone 3 0 **Lower Raleigh**	71	0	555	0	
Sandstone, conglomerate, **Quinnimont**	62	0	617	0	
Coal and bone, Fire Creek	0	10	617	10	161′ 4″
Fire clay	2	2	620	0	
Sandstone to bottom	5	0	625	0	7′ 2″

The above record, with the addition of some names for members, is as published on pages 316-17 of the Raleigh County Report.

E. J. Berwind Coal Test Boring No. B-3 (No. 67 on Map II).

In Fayetteville District, on Knob Branch, 1.4 miles N. 80° E. of Herberton (Willis Branch P. O.) and 0.5 mile north of Fayette-Raleigh County Line; authority, J. S. Cunningham; elevation, 1872.70′ L.

	Thickness.		Total.		
	Ft.	In.	Ft.	In.	
Sand and gravel	30	0	30	0	
Sandstone, **Lower Nuttall**	34	0	64	0	
Shale, with sandstone partings	39	2	103	2	
Slate	0	4	103	6	
Coal, Iaeger, "Hughes Ferry"	0	6	104	0	104′ 0″
Fire clay	0	2	104	2	
Shale, black	7	10	112	0	
Shale, with sandstone partings	4	2	116	2	
Sandstone, **Middle Iaeger**	32	2	148	4	
Slate	2	4	150	8	
Shale, black	2	1	152	9	
Slate	0	8	153	5	
Coal, Lower Iaeger	0	5	153	10	
Shale	1	0	154	10	
Sandstone, hard, **Harvey Conglomerate**	55	2	210	0	
Sandstone, harder, **Guyandot**	38	0	248	0	
Shale, dark	34	0	282	0	
Coal and bone, Sewell "B"	0	4	282	4	178′ 4″
Fire clay	7	6	289	10	
Sandstone	13	0	302	10	
Shale, dark, sandy	19	0	321	10	
Slate, black	34	8	356	6	
Bone .... 0′ 6″ **Coal** .... 1 0 } **Sewell "A"**	1	6	358	0	75′ 8″
Sandstone	4	6	362	6	
Fire clay	6	5	368	11	
Slate, black, **Hartridge**	13	9	382	8	
Slate, black, with **coal spars**	1	11	384	7	
Coal, Sewell	4	2	388	9	30′ 9″
Fire clay, to bottom	2	5	391	2	2′ 5″

The above record, with the addition of several names for members, is as published on pages 308-9 of the Raleigh County Report.

McKinley Land Company Coal Test Boring No. B (No. 68 on Map II).

In Fayetteville District, on Knob Branch 2.1 miles nearly due east from Herberton (Willis Branch P. O.); authority, J. B. Laing; elevation, 1980.34′ L.

	Thickness.		Total		
	Ft.	In.	Ft.	In.	
Casing	4	6	4	6	
Shale	1	0	5	6	
Sandstone, very hard	2	0	7	6	
Shale	1	6	9	0	
Coal, Lower Douglas	0	6	9	6	9′ 6″
Fire clay	1	0	10	6	

		Thickness.		Total.		
		Ft.	In.	Ft.	In.	
Sandstone, very hard		2	0	12	6	
Shale		3	0	15	6	
Sandstone, very hard		3	0	18	6	
Shale, sandstone partings		17	0	35	6	
Shale, blue		24	0	59	6	
Slate		2	0	61	6	
Coal, Iaeger "B"		0	9	62	3	52′ 9″
Fire clay		1	0	63	3	
Shale		11	2	74	5	
Sandstone, very hard .... 17′ 2″ Sandstone ..... 30 2 Shale, sandstone partings 30 3	**Lower Nuttall**	77	7	152	0	
Fire clay **Hughes Ferry Coal horizon**		1	0	153	0	
Slate, black		2	0	155	0	
Sandstone		19	5	174	5	
Shale, black		1	4	175	9	
Sandstone		21	0	196	9	
Shale, black		15	3	212	0	
Sandstone		9	2	221	2	
Slate		2	0	223	2	
Coal, Lower Iaeger		1	3	224	5	162′ 2″
Fire clay		1	0	225	5	
Sandstone and shale 12′ 2″ Sandstone, very hard 69 9	**Harvey Conglomerate**	81	11	307	4	
Shale		2	0	309	4	
Sandstone, very hard ....6′ 10″ Shale, sandstone partings 53 10	**Guyandot**	60	8	370	0	
Coal, Sewell "B"		0	3	370	3	145′ 10″
Fire clay		2	10	373	1	
Sandstone, shale partings ...... 7′ 11″ Sandstone, very hard ....13 8 Sandstone, shale partings ...... 6 2 Shale, blue......15 3 Sandstone, very hard .... 2 7 Shale, sandstone partings 47 1	**Lower Guyandot**	92	8	465	9	
Slate, **Hartridge**		5	7	471	4	
Coal, Sewell		1	5	472	9	102′ 6″
Slate, fine coal partings		9	6	482	3	
Fire clay		0	10	483	1	
Shale, sandstone parting, to bottom		30	5	513	6	40′ 9″

The above record, with the addition of several names for members, is as published on pages 315-16 of the Raleigh County Report.

Davis, Fudge et al. Coal Test Boring No. 3 (No. 74 on Map II).

In Fayetteville District, on branch of Packs Branch; 2¾ miles due west of Mt. Hope; authority, New River Co.; elevation, 1890′ L.

	Thickness. Ft.	In.	Total. Ft.	In.	
Surface, sand, and gravel	12	0	12	0	
Slate, blue	15	0	27	0	
Sandstone, **Lower Nuttall**	43	0	70	0	70′ 0″
Slate, blue	35	0	105	0	
Sandstone, very hard	10	0	115	0	
Shale, sandy	50	0	165	0	
Sandstone, very hard, **Harvey Conglomerate**	35	0	200	0	
Slate, blue	60	0	260	0	
Sandstone, **Guyandot, conglomerate**	35	0	295	0	
Slate, blue	20	0	315	0	
Sandstone, **Lower Guyandot**	35	0	350	0	
Slate, black, Hartridge	2	0	352	0	
Coal, (badly mixed), **Sewell**	4	0	356	0	286′ 0″
Fire clay, to bottom	2	0	358	0	2′ 0″

The above record, with the addition of some names for members, is as published on page 311 of the Raleigh County Report.

Davis, Fudge et al. Coal Test Boring No. 2 (No. 75 on Map II).

In Fayetteville District, on a south branch of Packs Branch, 0.6 mile south of Upper Packs Branch Schoolhouse; authority, New River Company; elevation, 2058.13′ L.

	Thickness. Ft.	In.	Total. Ft.	In.	
Surface	25	0	25	0	
Slate, blue	15	0	40	0	
Sandstone, gray, **Lower Dotson**	38	0	78	0	
Coal, Lower Douglas	1	0	79	0	79′ 0″
Slate, dark	5	0	84	0	
Sandstone, light. 11′ 0″					
Coal 0 4					16′ 4″
Slate, dark 10 0					
Sandstone 30 0 **Upper Nuttall**	51	4	135	4	
Slate, blue	15	0	150	4	
Fire clay	5	0	155	4	60′ 0″
Sandstone, **Lower Nuttall**	69	0	224	4	
Slate, dark, **Upper Iaeger**	19	0	243	4	
Coal, Iaeger, "Hughes Ferry"	0	8	244	0	88′ 8″
Sandstone, light 65′ 0″ **Harvey Conglomerate**	88	0	332	0	
Sandstone dark 23 0					
Slate, dark	50	0	382	0	
Shale, dark, sandy	70	0	452	0	

	Thickness. Ft.	In.	Total. Ft.	In.	
Sandstone, light, **Lower Guyandot**	45	0	497	0	
Coal and bone 3' 4" Sandstone, dark 6 0 **Coal, to bottom** 1 0 } **Sewell**	10	4	507	4	263' 4"

The above record, with the addition of several names for members and slight changes in correlation, is as published on pages 310-11 of the Raleigh County Report.

Davis, Fudge et al. Coal Test Boring No. 1 (No. 76 on Map II).

In Fayetteville District, in head of a south branch of Packs Branch, 0.9 mile south of Upper Packs Branch Schoolhouse and 2.6 miles west of Mt. Hope; authority, New River Company; elevation, 1995.45' L.

	Thickness. Ft.	In.	Total. Ft.	In.	
Sand and gravel	9	0	9	0	
Sandstone, light. 37' 0" Slate, dark 21 0 Slate, light 4 0 Sandstone 20 0 Slate, dark 3 0 Sandstone 28 0 } **Lower Nuttall**	113	0	122	0	
Shale, sandy	9	0	131	0	
Slate, dark, **Upper Iaeger**	24	0	155	0	
Coal, Iaeger, "Hughes Ferry"	0	10	155	10	155' 10"
Slate, light	62	0	217	10	
Sandstone, **Harvey Conglomerate**	20	0	237	10	
Slate, dark	70	0	307	10	
Coal, Castle	0	2	308	0	152' 2"
Sandstone, **Guyandot**	91	0	399	0	
Slate, mixed with **coal**	16	0	415	0	
Coal, bone, and slate 3' 0" **Coal** 0 8 } **Sewell**	3	8	418	8	110' 8"
Slate	4	0	422	8	
Sandstone 3' 0" Sandstone, very hard 26 0 } **Welch**	29	0	451	8	
Unrecorded	55	8	507	4	
Slate, black	7	0	514	4	
Sandstone, light, **Upper Raleigh**	30	0	544	4	
Slate, dark	17	0	561	4	142' 8"
Coal, Little Raleigh	1	0	562	4	
Fire clay	3	0	565	4	
Sandstone, **Lower Raleigh, porous,** micaceous	30	0	595	4	
Slate, dark	10	0	605	4	
Sandstone	4	0	609	4	
Sandstone, conglomerate, to bottom	3	0	612	4	

The above record, with the addition of several names for members, is as published on pages 309-310 of the Raleigh

County Report. It exhibits in a striking manner the tendency of the Lower Nuttall Sandstone to lose its massive character southward as the northern border of Raleigh County is approached.

The following is a very deep boring that was taken, with some slight changes, from pages 313-15 of the Raleigh County Report. It was used in obtaining the results indicated for one of the columns in the Sewell Coal table of intervals published in Chapter III, page 89:

Plum Orchard Coal and Land Company Coal Test Boring (No. 77 on Map II).

In Fayetteville District, on north bank of Packs Branch 2.3 miles N. 75° W. of Mt. Hope; authority, New River Collieries Co.; elevation, 1842.16′ L.

		Thickness.		Total.		
		Ft.	In.	Ft.	In.	
Stand-pipe		13	9	13	9	
Sandstone, gray, **Harvey Conglomerate**		46	1	59	10	
Sandstone, gray, and slate		9	11	69	9	
Slate and sandstone, mixed.. 11′ 5″ Slate and sandstone seams.. 67 9	**Guyandot**	79	2	148	11	
Coal, Sewell "B"		0	9	149	8	149′ 8″
Slate		2	6	152	2	
Slate and sandstone seams		2	10	155	0	
Sandstone, gray....... 6′ 9″ Sandstone, gray, and slate seams.......... 34 0	..	40	9	195	9	
Slate and sandstone seams		5	5	201	2	
Slate, **Hartridge**		17	4	218	6	
Coal .... 0′ 1 ″ Sulphur .... 0 1 **Coal** .... 0 8 Slate .... 0 1½ **Coal** .... 2 4 Slate .... 2 9 **Coal** .... 2 2 Slate .... 1 7½ **Coal** 1 4½	**Sewell**...	11	2½	229	8½	80′ 0½″
Sandstone, dark, with slate seams		6	7½	236	4	
Slate		4	11	241	3	
Sandstone, dark 6′ 3 ″ Sandstone, gray, soft .... 28 5½ Sandstone, gray, hard 114 3	**Upper Raleigh**	148	11½	390	2½	
Slate, sandy, **Little Raleigh Coal horizon**		1	0	391	2½	

	Thickness. Ft.	Thickness. In.	Total. Ft.	Total. In.	
Sandstone, gray, soft	5	0	396	2½	
Sandstone, gray, and slate, mixed	11	1	407	3½	
Sandstone, gray	17	1	424	4½	
Sandstone, gray, and slate, mixed	5	8½	430	1	
Sandstone, gray, with slate seams	42	6	472	7	
Sandstone, gray	4	0	476	7	
Slate	1	6	478	1	
Coal and bone seams, **Beckley**	0	8	478	9	249′ 0½″
Sandstone, gray, **Quinnimont**	28	9½	507	6½	
Shale, gray	2	8	510	2½	
Slate and shale, broken up	2	10	513	0½	
Sandstone, gray	12	0	525	0½	
Slate	14	4	539	4½	
Coal, Fire Creek	1	4	540	8½	61′ 11½″
Sandstone, gray	6	10	547	6½	
Slate, with seams of sandstone	16	8½	564	3	
Slate	10	4½	574	7½	
Slate and sandstone, mixed	27	6½	602	2	
Sandstone, gray	12	0	614	2	
Sandstone, gray, with seams of slate and **coal**	22	6	636	8	
Slate	1	2	637	10	
Slate and sandstone, mixed	11	1	648	11	
Slate	10	6½	659	5½	
Slate with seams of **coal**	2	3	661	8½	
Slate and fire clay, **No. 7 Pocahontas**	1	0	662	8½	122′ 0″
Slate and sandstone	27	6	690	2½	
Slate	1	0	691	2½	
Fire clay, **No. 6 Pocahontas**	1	6	692	8½	30′ 0″
Slate and sandstone, mixed	6	6	699	2½	
Slate	3	3	702	5½	
Slate and sandstone, mixed	6	0	708	5½	
Coal, No. 4 Pocahontas	0	2	708	7½	15′ 11″
Slate, sandstone, and fire clay, mixed	5	4	713	11½	
Slate and sandstone, mixed	16	1	730	0½	
Sandstone, gray, **Upper Pocahontas**	32	9½	762	10	
Slate	8	7½	771	5½	
Slate, spongy, with **coal** seams	0	3	771	8½	
Slate	0	8½	772	5	
Coal ....0′ 10 ″ Slate ....1 4½ **Coal** ....0 3½ } **No. 3 Pocahontas**	2	6	774	11	66′ 3½″
Slate	0	7	775	6	
Fire clay	0	11	776	5	
Slate, soft	0	10	777	3	
Slate, with little sandstone seams	29	7½	806	10½	
Slate and fire clay	1	0	807	10½	
Fire clay	5	9½	813	8	
Sandstone, soft, and fire clay	1	10	815	6	
Sandstone, soft, base of **Pottsville Series**	3	9	819	3	
Shale, gray	7	4½	826	7½	
Shale, red (Mauch Chunk)	9	2	835	9½	

	Thickness. Ft.	In.	Total. Ft.	In.
Shale, gray, and sandstone, mixed.	4	9	840	6½
Shale, gray	2	6	843	0½
Shale, gray and red, mixed	2	5	845	5½
Shale, red, to bottom	12	5	857	10½

F. N. Smith Coal Test Boring (No. 79A on Map II).

In Fayetteville District, on Sugar Creek at Mt. Hope, just ⅛ mile northwest of mouth of Sugar Creek; authority, Enoch Smith; elevation, 1715′ B.

	Thickness. Ft.	In.	Total. Ft.	In.	
Surface	26	7	26	7	
Sandstone, **Welch**	11	1½	37	8½	
Slate	1	10½	39	7	
Sandstone	0	10	40	5	
Slate	0	3	40	8	
Sandstone, hard, gray, **Upper Raleigh**	73	9	114	5	
Slate	2	10	117	3	
Sandstone, with streaks of slate	3	7	120	10	
Slate	1	7	122	5	
Sandstone, fine-grained ...... 26′ 7″ Slate .... 1 3 Sandstone ...... 37 9 **Lower Raleigh**	65	7	188	0	
Slate	11	11	199	11	
Bone .... 0′ 1″ Slate .... 0 2 **Coal** .... 1 2 **Beckley "Rider"**	1	5	201	4	201′ 4″
Slate	0	10	202	2	
Sandstone	4	2	206	4	
Slate, sandy	3	10	210	2	
Sandstone	1	4½	211	6½	
Slate, sandy	8	0½	219	7	
Sandstone, dark	2	1½	221	8½	
Shale, light, sandy	9	7	231	3½	
Slate, black	0	5	231	8½	
Coal, Beckley	1	4	233	0½	
Fire clay	0	8	233	8½	
Sandstone, fine-grained	16	2½	249	11	
Sandstone and streaks of slate	25	7	275	6	
Slate and sulphur balls	17	0	292	6	
Coal, Fire Creek	1	1	293	7	92′ 3″
Fire clay	0	5	294	0	
Fire clay or light slate	3	9	297	9	
Sandstone, fine	2	5	300	2	
Slate, sandy	4	1	304	3	
Sandstone, fine	0	5½	304	8½	
Slate	9	6	314	2½	
Fire clay and shale, **Little Fire Creek Coal horizon**	1	9	315	11½	22′ 4½

		Thickness. Ft.	In.	Total. Ft.	In.	
Sandstone, fine. 2′ 0″ Sandstone, hard, gray........ 5 1½ Sandstone and streak of slate 32 9	**Pineville**	39	10½	355	10	
Slate..........................		2	9	358	7	
Slate, light, sandy, with streaks of sandstone....................		8	8	367	3	
Sandstone and slate streaks......		9	1	376	4	
Slate..........................		0	5	376	9	
Slate, streaks of sandstone........		20	1½	396	10½	
Slate..........................		1	10½	398	9	
Coal, (No. 6 Pocahontas?).......		2	10½	401	7½	85′ 8″
Slate, to bottom..................		3	9½	406	5	3′ 9½″

The above record, with some slight changes in correlation and additions in names of members, is as published on pages 311-12 of the Raleigh County Report.

The 11 following detailed records are from borings located just across the line from Fayette in the northern edge of Raleigh County:

Price Hill Fuel Company Coal Test Boring No. 4 (No. 80 on Map II).

In Town District, Raleigh County, on head of Maple Fork; 0.8 mile west of Price Hill; authority, New River Company; completed, 1913; elevation, 2119′ L.

		Thickness. Ft.	In.	Total. Ft.	In.	
Surface........................		3	6	3	6	
Slate, soft......................		35	0	38	6	
Sandstone, **Lower Dotson**........		42	8	81	2	
Coal, Lower Douglas.............		1	4	82	6	82′ 6″
Slate..........................		8	0	90	6	
Sandstone...... 20′ 0″ Slate........... 18 0 Slate, dark...... 19 0 Sandstone...... 50 0	**Lower Nuttall**..	107	0	197	6	
Slate, dark......................		17	0	214	6	
Coal, Iaeger, "Hughes Ferry".....		1	0	215	6	133′ 0″
Sandstone, light.................		35	0	250	6	
Shale, sandy.....................		50	0	300	6	
Slate, dark......................		77	0	377	6	
Sandstone, light, **Guyandot**.......		40	0	417	6	
Slate, blue......................		7	0	424	6	
Sandstone, **Lower Guyandot**......		37	0	461	6	
Coal, Sewell....................		4	0	465	6	250′ 0″
Fire clay, to bottom..............		5	0	470	6	

The above record, with the addition of some names for members, is as published on pages 203-4 of the Raleigh County Report.

Price Hill Fuel Company Coal Test Boring No. 6 (No. 81 on Map II).

Town District, Raleigh County, on west side of Giles, Fayette and Kanawha Turnpike, 1¼ miles S. 20° W. of Price Hill; authority, New River Company; completed, March 4, 1914; elevation, 2234.36′ L.

			Thickness.		Total.		
			Ft.	In.	Ft.	In.	
Surface			10	0	10	0	
Clay			2	0	12	0	
Sandstone			24	0	36	0	
Sandstone and shale mixed, conglomerate			19	0	55	0	
Shale			34	0	89	0	
Shale and sandstone, mixed			8	0	97	0	
Sandstone	39′ 0″		162	0	259	0	
Shale and sandstone	37 0						
Sandstone	37 0						
Shale and sandstone	49 0						
Sandstone, conglomerate	51′ 0″	Harvey Conglomerate	96	0	355	0	
Sandstone	2 0						
Sandstone, conglomerate	26 0						
Sandstone, hard	9 0						
Sandstone, hard and conglomerate, mixed	8 0						
Shale, **Sandy Huff**			46	0	401	0	
Sandstone, hard	4′ 0″	**Guyandot**	91	0	492	0	
Sandstone, very hard	60 0						
Sandstone, very hard, mixed with small seams of coal	20 0						
Sandstone, very hard	5 0						
Sandstone	2 0						
Shale			7	8	499	8	
Bone	0′ 2″	**Sewell**	5	2	504	10	504′ 10″
Coal	0 2						
Bone	0 8						
Coal	4 2						
Shale			29	2	534	0	
Sandstone			5	0	539	0	
Shale			2	0	541	0	

				Thickness.		Total.		
				Ft.	In.	Ft.	In.	
Sandstone, conglomerate	3′	0″	Upper Raleigh	143	4	684	4	
Sandstone, very hard	18	0						
Sandstone, hard	16	0						
Shale	2	0						
Sandstone, very hard	2	0						
Sandstone, hard	10	0						
Sandstone, conglomerate, loose pebbles	6	0						
Sandstone	86	4						
Crevice				0	1	684	5	
Coal, Little Raleigh				0	2	684	7	179′ 9″
Sandstone, very hard	1′	5″	Lower Raleigh	39	5	724	0	
Sandstone	4	0						
Sandstone, conglomerate	2	0						
Sandstone, very hard	15	0						
Shale	3	0						
Sandstone, very hard	12	0						
Sandstone, conglomerate	2	0						
Coal, Beckley				2	8	726	8	42′ 1″
Sandstone, conglomerate	6′	4″	Quinnimont	104	2	830	10	
Sandstone, very hard	7	0						
Shale	18	0						
Sandstone, very hard	32	0						
Sandstone, very hard, impregnated with small seams of coal, $\frac{1}{16}$″ thick	1	0						
Sandstone, very hard	39	10						
Coal, Fire Creek				0	6	831	4	104′ 8″
Fire clay				1	8	833	0	
Shale				11	0	844	0	
Shale, sandy				33	0	877	0	
Sandstone, soft				43	0	920	0	
Sandstone, medium-hard and broken				5	0	925	0	
Shale, green and red, and soft green sandstone				25	0	950	0	
Sandstone, and shale, with **coal streaks**				14	0	964	0	
Sandstone and shale				30	0	994	0	
Sandstone				4	0	998	0	

	Thickness.		Total.		
	Ft.	In.	Ft.	In.	
Shale	2	2	1000	2	
Coal, No. 6 Pocahontas	0	5½	1000	7½	169′ 3½″
Sandstone and shale, to bottom	1	6¼	1002	1¾	1′ 6¼″

The above record is as published on pages 205-7 of the Raleigh County Report.

Price Hill Fuel Company Coal Test Boring No. 9 (No. 82 on Map II).

In Town District, Raleigh County, on west side of Old Bluestone Road, S. 13° W. 1.6 miles from Price Hill; authority, New River Company; completed, May 2, 1914; elevation, 2285.61′ L.

	Thickness.		Total.		
	Ft.	In.	Ft.	In.	
Clay	12	0	12	0	
Sandstone, **Upper Nuttall**, shale or sandy shale	47	0	59	0	
Sandstone ...... 10′ 0″ Shale .... 63 0 Sandstone ...... 37 0 } **Lower Nuttall**	110	0	169	0	169′ 0″
Shale	19	0	188	0	
Sandstone, conglomerate, **Harvey**	82	0	270	0	
Shale, **Sandy Huff**	100	0	370	0	
Sandstone, **Guyandot**	34	0	404	0	
Shale	10	0	414	0	
Sandstone	1	0	415	0	
Shale, sandy	16	0	431	0	
Sandstone, **Lower Guyandot**	22	0	453	0	
Shale, blue, **Hartridge**	2	0	455	0	
Coal, Sewell	3	9	458	9	289′ 9″
Fire clay, to bottom	2	3	461	0	2′ 3″

The above record, with the addition of some names for members, is as published on page 208 of the Raleigh County Report. Here, both the Upper Nuttall and Lower Nuttall Sandstone ledges have largely lost their massive character that prevails northeastward in Fayette.

Price Hill Fuel Company Coal Test Boring No. 7 (No. 83 on Map II).

In Town District, Raleigh County, on east side of Giles, Fayette, and Kanawha Turnpike, 1.8 miles S. 30° W. of Price Hill; authority, New River Company; completed, March 23, 1914; elevation, 2348.57′ L.

			Thickness.		Total.		
			Ft.	In.	Ft.	In.	
Clay			14	0	14	0	
Sandstone, decomposed	19′ 0″	**Upper Nuttall**	104	0	118	0	
Shale	53 0						
Sandstone	32 0						
Shale			26	0	144	0	
Sandstone	58′ 0″	**Lower Nuttall**	133	0	277	0	
Shale	43 0						
Sandstone	32 0						
Sandstone, with small streaks of **coal (Iaeger)** $\frac{1}{16}$″ thick			5	0	282	0	282′ 0″
Sandstone and shale, mixed			95	0	377	0	
Sandstone, conglomerate	18′ 0″	**Harvey Conglomerate**	26	0	403	0	
Sandstone	8 0						
Shale, **Sandy Huff**			88	0	491	0	
Sandstone, **Guyandot**			21	0	512	0	230′ 0″
Sandstone and shale with small seams of **coal (Sewell "B")** $\frac{1}{16}$″ thick			12	0	524	0	
Sandstone and shale			35	0	559	0	
Sandstone			17	0	576	0	
Shale			1	0	577	0	
Coal	4′ 0″	**Sewell**	4	7½	581	7½	69′ 7½″
Coal and bone, interlaminated	0 7½						
Shale, to bottom			1	0½	582	8	1′ 0½″

The above record, with some additional names for members, is as published on page 207 of the Raleigh County Report.

Russell Land Company Coal Test Boring No. 10 (No. 84 on Map II).

In Town District, Raleigh County, on north bank of Middle Fork of Sand Fork, of Paint Creek, 2 miles S. 50° W. of Price Hill; authority, New River Company; completed, May 18, 1914; elevation, 2126.22′ L.

	Thickness.		Total.		
	Ft.	In.	Ft.	In.	
Clay and boulders	9	0	9	0	
Quicksand and boulders	5	0	14	0	
Sandstone, **Lower Nuttall**	101	0	115	0	115′ 0″
Shale	21	0	136	0	
Sandstone, **Harvey Conglomerate**	50	0	186	0	

	Thickness. Ft.	Thickness. In.	Total. Ft.	Total. In.	
Shale	20	0	206	0	
Sandstone and sandy shale	34	0	240	0	
Sandstone, conglomerate, **Guyandot**	60	0	300	0	185′ 0″
Shale	86	0	386	0	
Sandstone	10	0	396	0	
Sandstone, with small seams of coal 1/16″ thick	38	2	434	2	
Coal, Sewell	0	7	434	9	134′ 9″
Shale	7	3	442	0	
Sandstone	2	0	444	0	
Shale, hard, to bottom	18	0	462	0	

The above record, with some slight changes and additions, is as published on pages 250-1 of the Raleigh County Report.

E. J. Berwind Coal Test Boring No. B-6 (No. 85 on Map II).

In Town District, Raleigh County, at mouth of Maple Fork, 3½ miles S. 70° W. of Price Hill; completed, August 23, 1909; elevation, 1865.41′ L.

			Thickness. Ft.	Thickness. In.	Total. Ft.	Total. In.	
Surface			25	0	25	0	
Sandstone, very hard, **Harvey Conglomerate**			75	0	100	0	
Shale, dark, sandy			6	0	106	0	
Sandstone			5	0	111	0	
Shale, dark			15	0	126	0	
Fire clay, **Castle Coal horizon**			1	0	127	0	127′ 0″
Sandstone			8	0	135	0	
Shale, dark			76	0	211	0	
Slate, black			21	0	232	0	
Sandstone	16′ 0″	**Lower Guyandot**	35	4	267	4	
Slate, black	14 0						
Sandstone	5 4						
Slate	3′ 4″	**Hartridge**	5	1	272	5	
Slate, black	1 9						
Bone and coal mixed	0′ 1″	**Sewell**	3	10	276	3	149′ 3″
Coal, (core lost 3′ 2″)	3 9						
Fire clay, black, to bottom			2	3	278	6	2′ 3″

The above record, with some slight additions, is as published on page 249 of the Raleigh County Report.

Enoch Smith Coal Test Boring No. B-20 (No. 86 on Map II).

In Town District, Raleigh County, on Maple Fork, 3 miles S. 75° W. of Price Hill; authority, J. S. Cunningham; completed, June 20, 1912; elevation, 2035.45′ L.

	Thickness.		Total.		
	Ft.	In.	Ft.	In.	
Surface	13	0	13	0	
Shale	1	0	14	0	
Sandstone, **Upper Nuttall**	69	6	83	6	
Slate, black	34	8	118	2	
Sandstone, **Lower Nuttall**	47	2	165	4	165′ 4″
Slate, black	18	6	183	10	
Sandstone and shale	17	4	201	2	
Sandstone, hard, **Harvey**	77	6	278	8	
Shale, sandy	1	0	279	8	
Shale, dark	9	6	289	2	
Sandstone and shale	8	0	297	2	
Slate, black	89	3	386	5	
Sandstone	9	4	395	9	
Shale, dark, sandy	1	3	397	0	
Sandstone	1	0	398	0	
Slate, black	17	6	415	6	
Shale, dark, sandy	26	3	441	9	
Shale, dark	2	6	444	3	
Coal .... 2′ 3″					
Coal, bony......0 1½ **Sewell..**	3	2	447	5	282′ 1″
Coal 0 6½					
Coal, bony...... 0 3					
Fire clay, hard, to bottom	6	0	453	5	6′ 0″

The above record, with some slight changes, is as published on pages 215-16 of the Raleigh County Report.

Enoch Smith Coal Test Boring No. B-23 (No. 87 on Map II).

In Town District, Raleigh County, on Maple Fork of Sand Fork, 2.6 miles due west of Price Hill; authority, J. S. Cunningham; completed, August 5, 1912; elevation, 2112.64′ L.

	Thickness.		Total.	
	Ft.	In.	Ft.	In.
Surface	23	0	23	0
Shale, light, sandy	8	9	31	9
Shale, dark	4	2	36	0
Shale, light	12	10	48	10
Shale, sandy	11	10	60	8
Sandstone, hard 47′ 6″ **Upper**	122	1	182	9
Sandstone ...... 73 7 **Nuttall**				
Slate, black	36	11	219	8
Sandstone, hard. 46′ 6″ **Lower**				
Sandstone and **Nuttall...**	51	0	270	8
shale 4 6				
Shale, dark	15	2	285	10
Slate, black	3	6	289	4

		Thickness. Ft.	In.	Total. Ft.	In.
Sandstone and shale .... 15′ 0″ Sandstone, hard 61 10 Sandstone and slate 7 0	Harvey Conglomerate	83	10	373	2
Shale, sandy, dark		3	0	376	2
Sandstone and shale		8	2	384	4
Slate, black		74	10	459	2
Sandstone, Lower Guyandot		52	5	511	7
Slate, black, Hartridge		15	5	527	0
Coal .... 0′ 11½″ Slate, black... 2 3½ Coal 3 9½	Sewell..	7	0½	534	0½
Fire clay, to bottom		2	11½	537	0

The above record, with some slight changes and additions, is as published on pages 247-8 of the Raleigh County Report.

Enoch Smith Coal Test Boring No. B-19 (No. 88 on Map II).

In Town District, Raleigh County, ½ mile N. 15° W. of mouth of Maple Fork, 3.6 miles S. 70° W. of Price Hill; authority, J. S. Cunningham; completed, June 3, 1912; elevation, 2073.33′ L.

		Thickness. Ft.	In.	Total. Ft.	In.	
Surface		10	0	10	0	
Sandstone, hard 30′ 0″ Shale, dark..... 0 6 Sandstone 22 0	Upper Nuttall.	52	6	62	6	
Coal, bony, Iaeger "B"		0	1	62	7	62′ 7″
Sandstone ...... 2′ 0″ Shale, dark..... 2 7 Sandstone ...... 1 0 Sandstone, dark. 4 2 Sandstone ...... 43 4 Shale, dark, sandy 1 0 Sandstone 1 9	Lower Nuttall.	55	10	118	5	
Shale, variegated		3	6	121	11	
Slate, black		41	3	163	2	
Shale, dark, sandy		3	2	166	4	
Coal, bony, Lower Iaeger		0	2	166	6	103′ 11″
Sandstone		35	11	202	5	
Slate, black		1	3	203	8	
Sandstone		3	3	206	11	
Slate, black		11	0	217	11	
Sandstone		16	9	234	8	
Sandstone, hard, Harvey Conglomerate		85	5	320	1	
Slate, black		0	11	321	0	
Shale, dark, sandy		2	3	323	3	
Slate, black		15	6	338	9	
Shale, sandy		5	0	343	9	

	Thickness. Ft.	Thickness. In.	Total. Ft.	Total. In.	
Slate, black	2	0	345	9	
Shale, light	2	9	348	6	
Slate, black	78	10	427	4	
Coal, Sewell "A"	0	6	427	10	261′ 4″
Slate, black	1	0	428	10	
Sandstone	19	1	447	11	
Slate, black	6	10	454	9	
Sandstone	1	8	456	5	
Shale, sandy	23	10	480	3	
Slate, black	0	3	480	6	
Shale, dark, sandy	5	11	486	5	
Shale, dark	2	0	488	5	
Coal, Sewell	2	0	490	5	62′ 7″
Fire clay, hard	6	7	497	0	
Shale, dark	14	9	511	9	
Coal, "split" off Sewell	0	8	512	5	22′ 0″
Bone	0	10	513	3	
Fire clay, black	0	5	513	8	
Shale, dark, sandy	11	0	524	8	
Shale, dark	34	10	559	6	
Coal, Welch	0	2	559	8	47′ 3″
Sandstone, hard, **Upper Raleigh**	82	10	642	6	
Coal, Little Raleigh "A"	0	8	643	2	
Fire clay	5	10	649	0	
Shale, dark, sandy	4	10	653	10	
Slate, black	2	9	656	7	
Coal, Little Raleigh "A"	0	3	656	10	97′ 2″
Fire clay	4	6	661	4	
Shale, dark	7	3	668	7	
Coal, Little Raleigh	0	10	669	5	
Fire clay	2	7	672	0	
Shale, dark	6	4	678	4	
Sandstone	9	0	687	4	
Shale, dark, sandy	6	1	693	5	
Slate, black	4	1	697	6	
Coal, Beckley "Rider"	1	2	698	8	41′ 10″
Bone	2	0	700	8	
Slate, black	8	11	709	7	
Coal, Beckley	4	9	714	4	15′ 8″
Slate and **coal** streaks	1	2	715	6	
Slate and fire clay	1	7	717	1	
Shale, dark, sandy	0	7	717	8	
Sandstone, to bottom	5	9	723	5	9′ 1″

The above record, with some minor changes in correlation and additions, is as published on pages 302-3 of the Raleigh County Report.

E. J. Berwind Coal Test Boring No. B-2 (No. 89 on Map II).

In Town District, Raleigh County, on north bank of Sims Branch, 3.3 miles due west of Price Hill; elevation 2003.22' L.

				Thickness.		Total.		
				Ft.	In.	Ft.	In.	
Surface				6	0	6	0	
Sandstone				10	0	16	0	
Slate and fire clay				18	0	34	0	
Sandstone, **Lower Nuttall**				55	0	89	0	
Shale, dark	15'	0"	**Upper**					
Slate, dark	32	0	**Iaeger**	47	0	136	0	
Coal, Iaeger, "Hughes Ferry"				0	1	136	1	136' 1"
Sandstone, very hard, **Middle Iaeger**				30	0	166	1	
Shale and slate				47	0	213	1	
Sandstone, **Harvey Conglomerate**				67	6	280	7	
Slate, black				17	5	298	0	
Sandstone, hard				2	0	300	0	
Slate, black				57	0	357	0	
Sandstone, **Lower Guyandot**				31	0	388	0	251' 11"
Slate, black				25	0	413	0	
Shale, dark	40'	6"						
Shale, black	0	4	**Hartridge**	40	10	453	10	
Coal	1'	2"						
Slate, black	0	5						
Coal	0	5	**Sewell**	9	1	462	11	74' 11"
Slate, dark	5	11						
Bone	0	4						
Coal	0	10						
Fire clay				3	2	466	1	
Shale, sandstone partings				21	0	487	1	
Slate and fire clay				5	0	492	1	
Sandstone				6	9	498	10	
Shale and sandstone partings				3	6	502	4	
Sandstone, very hard, **Upper Raleigh**, to bottom				33	6	535	10	

The above record, with changes in correlation and additional names for members, is as published on page 140 of the Raleigh County Report.

E. J. Berwind Coal Test Boring No. C (No. 90 on Map II).

In Town District, Raleigh County, on Sims Branch of Paint Creek, 0.9 mile southeast from Cirtsville P. O.; authority, J. S. Cunningham; completed, August, 1906; elevation, 1786.05' L.

	Thickness.		Total.	
	Ft.	In.	Ft.	In.
Surface	15	2	15	2
Sand, slate	6	2	21	4

				Thickness.		Total.		
				Ft.	In.	Ft.	In.	
Sandstone and slate	1'	4"	**Harvey Conglomerate**	78	6	99	10	
Sandstone	13	4						
Sandstone, black streaks	23	1						
Sandstone	21	7						
Sandstone and slate	2	0						
Sandstone	2	10						
Sandstone and slate	4	5						
Sandstone	9	11						
Slate				7	5	107	3	
Sandstone and slate	6'	1"	**Guyandot**	39	4	146	7	
Sand, slate	24	4						
Sandstone	1	6						
Sandstone and slate	1	8						
Sandstone	5	9						
Slate, sandy				40	1	186	8	
Slate				1	2	187	10	
Coal, Sewell "B"				0	6	188	3	188' 3"
Fire clay				6	10	195	1	
Sandy slate				4	10	199	11	
Sandstone	14'	1"	**Lower Guyandot**	44	3	244	2	
Sandstone and slate	30	2						
Sandy slate				19	4	263	6	
Slate, **Hartridge**				5	10	269	4	
Coal	0'	6"	**Sewell**	16	1	285	5	97' 2"
Slate and **coal**	1	1						
Coal	4	4						
Core lost	0	2						
Coal and slate	1	3						
Slate	7	4						
Coal	1	5						
Slate				2	8	288	1	
Sandrock and sand slate				8	3	296	4	
Core left in hole				3	10	300	2	

The above record, with some additional names for members, is as published on pages 202-3 of the Raleigh County Report.

COAL TEST BORING RECORDS, SEWELL MOUNTAIN DISTRICT.

In Sewell Mountain District a total of 35 borings have been sunk to test the coal beds, and of these the Survey was able to obtain the detailed logs for publication of only seven—

Nos. 93, 93B, 93C, 93D, 111, 119, and 120 on Map II, the details of which are given below. The only information that is available for the others is that given in the Summarized Table of Coal Test Borings, pages 388B-388C. In this table permission was not given to publish the thickness of the coal beds penetrated for Nos. 111-121 on Map II, listed for the New River & Pocahontas Consolidated Coal Company, with the exception of Nos. 111, 119, and 120 on Map II. The four following records of coal test borings in the northern border of Sewell Mountain District were kindly furnished the Survey by C. E. Krebs of Charleston, W. Va., the correlation of the coal beds being determined by the author:

Brackens Creek Coal & Land Company Coal Test Boring No. 2 (No. 93 on Map II).

In Sewell Mountain District, on waters of Brackens Creek, on hillside just southeast of road fork, 1.4 miles N. 75° W. of Shelton Schoolhouse; by Brackens Creek Coal & Land Company, authority, with C. E. Krebs; completed in 1913; elevation, 2357′ L.

			Thickness. Ft.	Thickness. In.	Total. Ft.	Total. In.	
Surface			5	6	5	6	
Sandstone	6′ 7″	**Guyandot**	51	0	56	6	56′ 6″
Shale, sandy	0 8						
Sandstone	27 7						
Sand, shaly	0 11						
Sandstone	15 3						
Shale, blue, sandy			67	4	123	10	
Shale, soft			1	2	125	0	
Slate, coal partings, Sewell "A"			1	0	126	0	69′ 6″
Sandstone, shale partings			8	9	134	9	
Shale, sandy			5	6	140	3	
Fire clay, bastard			5	1	145	4	
Shale, sandy, blue			3	4	148	8	
Sandstone			1	4	150	0	
Shale, sandy			3	0	153	0	
Sandstone			1	8	154	8	
Shale, sandy			1	9	156	5	
Sandstone			0	8	157	1	
Shale, sandy			0	2	157	3	
Sandstone			0	5	157	8	
Shale, soft			0	2	157	10	
Coal	1′ 1″	**Sewell**	1	6½	159	4½	33′ 4½″
Slate and coal parting	0 5½						
Fire clay, bastard			1	10	161	2½	
Shale, sandy			24	10½	186	1	
Shale, dark-blue			38	1	224	2	
Shale, sandy			0	4	224	6	

	Ft.	In.		Thickness. Ft.	Thickness. In.	Total. Ft.	Total. In.	
Sandstone and coal partings	6′	7″						
Shale, sandy	6	6						
Shale, black, and coal partings	5	11	Upper					
Shale, sandy	28	0	Raleigh	85	8	310	2	
Sandstone	6	4						
Sandstone, coal partings	14	8						
Shale, sandy	17	8						
Coal and slate, Little Raleigh				0	7	310	9	151′ 4½″
Shale, sandy				20	0	330	9	
Shale, blue				3	6	334	3	
Slate and coal partings				0	2	334	5	
Fire clay				1	3	335	8	
Sandstone, Lower Raleigh, to bottom				29	4	365	0	54′ 3″

Brackens Creek Coal & Land Company Coal Test Boring No. 4 (No. 93B on Map II).

In Sewell Mountain District, on a south branch of Brackens Creek, 1.8 miles S. 35° W. of Russellville; by Brackens Creek Coal & Land Company, authority, with C. E. Krebs; elevation 2124′ L.

	Ft.	In.		Thickness. Ft.	Thickness. In.	Total. Ft.	Total. In.	
Surface				14	9	14	9	
Sandstone, soft, and shale				24	3	39	0	
Sandstone, Guyandot				13	3	52	3	
Coal, Sewell "B"				0	6	52	9	52′ 9″
Fire clay				1	6	54	3	
Shale, sandy				20	9	75	0	
Shale, blue				17	7	92	7	
Fire clay				1	4	93	11	
Sandstone				5	7	99	6	
Shale, blue				16	4	115	10	
Shale, black				0	8	116	6	
Shale, blue				0	8	117	2	
Shale, black				1	3	118	5	
Coal, Sewell "A"				0	4	118	9	66′ 0″
Shale, sandy				6	0	124	9	
Shale, dark				16	9	141	6	
Coal	0′	1″						
Slate	0	1	Sewell	2	5½	143	11½	25′ 2½″
Coal	1	5						
Slate and coal	0	10½						
Shale, black				0	7	144	6½	
Sandstone, shaly, Welch				50	5½	195	0	
Coal and slate, Welch				0	8	195	8	51′ 8½″
Shale, sandy				29	6	225	2	
Sandstone with shale partings	3′	4″	Upper					
			Raleigh	22	4	247	6	51′ 10″
Sandstone	19	0						

Brackens Creek Coal & Land Company Coal Test Boring No. 3 (No. 93C on Map II).

In Sewell Mountain District, on a branch of Brackens Creek, southeast of Hogpen Ridge, 0.9 mile N. 15° W. of Shelton Schoolhouse, and 2.6 miles N. 15° E. of Clifftop; by Brackens Creek Coal & Land Company, authority, with C. E. Krebs; completed, January 9, 1913; elevation, 2345′ L.

				Thickness.		Total.		
				Ft.	In.	Ft.	In.	
Surface				12	4	12	4	
Sandstone, **Harvey Conglomerate**				61	2	73	6	
Shale				10	6	84	0	
Sandstone				2	1	86	1	
Shale, dark				19	3	105	4	
Coal, Castle				0	2	105	6	105′ 6″
Clay, bastard				1	3	106	9	
Sandstone	6′	0″	**Guyandot**	38	9	145	6	
Shale, sandy	4	0						
Sandstone	0	10						
Shale, sandy	3	7						
Sandstone	1	0						
Shale, dark	1	0						
Sandstone	3	9						
Shale	0	5						
Sandstone	18	2						
Coal and bone, Sewell "B"				0	6	146	0	40′ 6″
Fire clay				2	0	148	0	
Sandstone				4	0	152	0	
Shale, sandy				17	2	169	2	
Sandstone				4	0	173	2	
Shale, dark				26	6	199	8	
Sandstone				7	6	207	2	
Shale, dark				16	10	224	0	
Coal	0′	11½″	**Sewell**	3	6¼	227	6¼	81′ 6¼″
Parting	0	8¼						
Coal	1	10½						
Slate, to bottom				1	5¾	229	0	1′ 5¾″

Brackens Creek Coal & Land Company Coal Test Boring No. 1 (No. 93D on Map II).

In Sewell Mountain District, on hillside 0.28 mile S. 45° W. from Shelton Schoolhouse and 1.75 miles northeast of Clifftop; by Brackens Creek Coal & Land Company, authority, with C. E. Krebs; completed, December 24, 1912; elevation, 2431′ L.

	Thickness.		Total.	
	Ft.	In.	Ft.	In.
Surface	12	11	12	11
Shale	14	6	27	5
Shale, sandy	36	0	63	5
Sandstone	10	6	73	11
Shale, dark	23	0	96	11

	Thickness.		Total.		
	Ft.	In.	Ft.	In.	
Sandstone	14	6	111	5	
Shale, sandy	5	6	116	11	
Shale, dark	35	0	151	11	
Coal, bone, Sewell "A"	0	3	152	2	152′ 2″
Clay, bastard	5	0	157	2	
Sandstone, **Lower Guyandot**	24	5	181	7	
Coal, bone ...... 0′ 2″ } **Sewell**	1	1	182	8	30′ 6″
Coal 0 11					
Fire clay	2	6	185	2	
Sandstone	12	0	197	2	
Shale	32	10	230	0	
Sandstone	20	0	250	0	
Shale, sandy	10	0	260	0	
Sand and shale	26	1	286	1	
Bone	0	1	286	2	
Sandstone and **coal** partings	4	6	290	8	
Shale, sandy	9	4	300	0	117′ 4″

The four coal test boring records given last above for the Brackens Creek region show that in this portion of Sewell Mountain District the Sewell Coal bed is somewhat thin and irregular and of doubtful worth, with the possible exception of No. 93C.

The three following records from borings in the same District are those mentioned on a preceding page in the paragraph immediately preceding the record of Boring No. 93 on Map II:

Coal Test Boring—No. 111 on Map II.

In Sewell Mountain District, on east bank of Laurel Creek, southeast of Pine Grove Schoolhouse, 2.7 miles S. 75° E. of Landisburg; No. 3 Beury, by New River & Pocahontas Consolidated Coal Company; authority, J. S. Cunningham; elevation, 2545′ L.

	Thickness.		Total.		
	Ft.	In.	Ft.	In.	
Surface	10	0	10	0	
Shale	10	0	20	0	
Sandstone, **Lower Raleigh**	90	0	110	0	
Slate	0	10	110	10	
Coal, Beckley (2434′ L.)	0	5	111	3	111′ 3″
Slate	0	9	112	0	
Sandstone ...... 16′ 0″					
Shale .... 20 6 } **Quinnimont**	47	0	159	0	
Sandstone 10 6					
Sandstone and shale	16	0	175	0	
Shale, **Quinnimont**	68	6	243	6	
Coal, Fire Creek (2297′ L.)	3	10	247	4	136′ 1″
Sandstone	6	0	253	4	

	Thickness. Ft.	In.	Total. Ft.	In.	
Shale	8	0	261	4	
Coal, Little Fire Creek	1	0	262	4	
Slate	2	0	264	4	
Sandstone, **Pineville**	35	8	300	0	52′ 8″

The above boring starts 125 feet below the outcrop of the Sewell Coal, the latter being operated for local domestic fuel in the surrounding hills. There is absolutely no doubt as to the correlation of the Fire Creek Coal in the record, so that the interval between the latter and the Sewell has increased to about 375 feet from 300 to 325 prevailing along the New River gorge below Thurmond.

Coal Test Boring—No. 119 on Map II.

In Sewell Mountain District on south bank of Glade Creek, 0.3 mile southeast of Pittman Schoolhouse and 1.0 mile north of Danese; No. 5, by New River and Pocahontas Consolidated Coal Company; authority, J. S. Cunningham; elevation, 2554′ L.

			Thickness. Ft.	In.	Total. Ft.	In.	
Surface			9	6	9	6	
Shale, gray, sandy			18	6	28	0	
Sandstone			14	9	42	9	
Shale, gray			3	4	46	1	
Slate			1	0	47	1	
Bone, Little Raleigh Coal			0	7	47	8	47′ 8″
Shale, gray			14	0	61	8	
Sandstone	17′ 5″						
Shale	0 9						
Sandstone, conglomerate	42 4	**Lower Raleigh**	64	6	126	2	
Shale, soft, gray	4 0						
Sandstone			4	0	130	2	
Shale, sandy			11	6	141	8	
Shale, gray, with iron and sulphur			5	6	147	2	
Slate			1	7	148	9	
Coal, Beckley (2405′ L.)			1	1	149	10	102′ 2″
Shale			0	6	150	4	
Shale, variegated			2	0	152	4	
Shale, sandy			3	0	155	4	
Shale, dark			6	0	161	4	
Shale, sandy			3	0	164	4	
Slate, gray			14	5	178	9	
Shale, gray, sandy			18	6	197	3	
Shale, gray	25′ 0″						
Slate	0 6						
Bone	0 8	**Quinnimont**	73	6	270	9	
Slate, gray	47 4						

	Thickness.		Total.		
	Ft.	In.	Ft.	In.	
Slate	15	4	286	1	
Coal, bone........ 0′ 1″ } **Fire**					
Coal .... 3 4 } **Creek** ..	3	5	289	6	139′ 8″
Shale, gray, to bottom...........	2	0	291	6	2′ 0″

The above boring starts 70 feet below the top of the Upper Raleigh Sandstone cliff and 135 feet below the Sewell Coal, thus giving the interval between the base of the latter bed and that of the Fire Creek Coal a total of 425 feet, the maximum observed in the County. This represents an increase of 100 feet from that prevailing southwestward at Thurmond, a feature that is in direct opposition to the general southwestward and southeastward thickening of the several groups of the Pottsville Series in the southern two-thirds of West Virginia.

Coal Test Boring—No. 120 on Map II.

In Sewell Mountain District, on south bank of Smoky Branch at mouth of Sandy Creek, 1.0 mile northwest of Danese; No. 21, by New River and Pocahontas Consolidated Coal Company; authority, J. S. Cunningham; elevation, 2560.42′ L.

	Thickness.		Total.		
	Ft.	In.	Ft.	In.	
Surface	7	0	7	0	
Sandstone, **Lower Raleigh**........	24	0	31	0	
Shale, light and dark.............	4	6	35	6	
Shale, dark, sandy................	12	6	48	0	
Shale, dark......................	5	10	53	10	
Coal and bone. Beckley (2506′ L.).	0	7	54	5	54′ 5″
Shale, light, and soapstone......	2	7	57	0	
Sandstone .... 24′ 0″ }					
Shale, dark, sandy 11 8 } **Quinni-**					
Sandstone .... 11 2 } **mont**..	91	10	148	10	
Shale, dark, sandy. 14 2 }					
Sandstone .... 30 10 }					
Shale, dark, **Quinnimont**.........	61	6	210	4	
Coal and bone. 0′ 1½″ }					
Coal .... 3 7½ } **Fire Creek**					
Bone .... 0 4½ } **(2346′ L.)**..	4	5½	214	9½	160′ 4½″
Coal .... 0 4 }					
Soapstone, to bottom.............	0	2½	215	0	

The above boring starts 180 feet below the Sewell Coal and 110 to 120 feet below the top of the Upper Raleigh Sandstone.

The incomplete record of the **New River & Pocahontas Consolidated Coal Company Boring No. 19—No. 112 on Map**

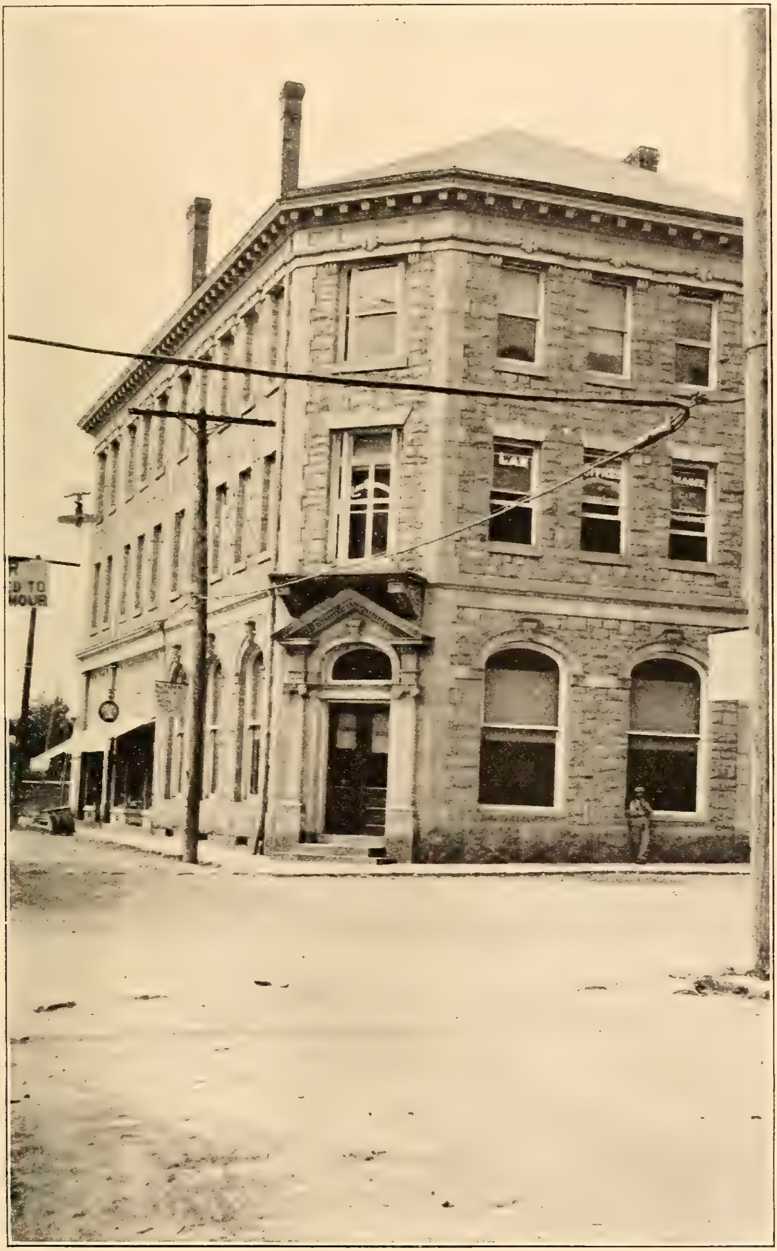


PLATE XV.—View showing Fayette County National Bank building at Fayetteville, constructed with stone obtained at local quarries in Upper Nuttall Sandstone ledge.

II—located in Sewell Mountain District, 4 miles S. 80° W. of Rainelle on the west bank of Glade Creek, 0.8 mile above the mouth of Rock Camp Branch, is published in Chapter IV in connection with the Sims Schoolhouse Section, page 204.

COAL TEST BORING RECORDS, QUINNIMONT DISTRICT.

As shown in the Table of Coal Test Borings, page 388C, a total of 22—Nos. 121-142 on Map II—have been completed in Quinnimont District, all by the New River & Pocahontas Consolidated Coal Company. The author had access to the logs of all these borings but permission was not granted to publish the thickness of the coal beds encountered. The table last mentioned, however, gives considerable data concerning them. The incomplete record of **Boring No. 136 on Map II** is published in Chapter IV in connection with the Walnut Flat Schoolhouse Section, page 217.

On the south side of New River from Quinnimont District in the edge of Raleigh County a series of coal test borings has been sunk that should give some light on the probable character and persistence of the coal beds in the former area, the detailed logs of which, as published in the Raleigh County Report, with the exception of some slight changes, are as follows:

Huling et al. Coal Test Boring No. 5 (No. 143 on Map II).

In Shady Spring District, Raleigh County, on Smith Mountain, one mile of Pear; authority, J. T. Lightner; from pages 299-300 of Raleigh County Report; elevation, 2810′ B.

	Thickness.		Total.		
	Ft.	In.	Ft.	In.	
New River Group (71′ 6″)					
Clay, yellow	5	6	5	6	
Sandstone	34	9	40	3	
Coal, No. 9 Pocahontas	0	3	40	6	40′ 6″
Slate, gray, hard bands	30	3	70	9	
Coal, No. 8 Pocahontas, slate partings	0	9	71	6	31′ 0″
Pocahontas Group (143′ 6″)					
Slate	2	0	73	6	
Slate, coal partings	1	6	75	0	
Slate, sandy	11	0	86	0	
Slate, gray, hard bands	6	6	92	6	
Slate, black	2	6	95	0	
Slate, sandy	6	9	101	9	

	Thickness.		Total.		
	Ft.	In.	Ft.	In.	
Sandstone	5	9	107	6	
Slate, sandy	1	5	108	11	
Sandstone	1	10	110	9	
Slate, sandy	11	3	122	0	
Slate, gray...... 15' 0" Slate, black...... 2 9 } Rift Shale	17	9	139	9	
Coal, No. 7 Pocahontas	0	7	140	4	68' 10"
Slate, sandy	7	8	148	0	
Slate, sandy, **coal** partings	2	0	150	0	
Sandstone	7	6	157	6	
Slate, sandy	1	6	159	0	
Slate, dark, mixed with **coal**	0	6	159	6	
Slate, gray, sandy	7	10	167	4	
Slate, dark, mixed with **coal**	3	0	170	4	
Slate, gray, sandy	5	8	176	0	
Slate, sandy	7	9	183	9	
Slate, black, **coal** seams	0	4	184	1	
Coal .... 0' 4" Slate, hard, gray bands.. 5 7 **Coal** .... 0 3 } **No. 6 Pocahontas.**	6	2	190	3	49' 11"
Slate, sandy	13	3	203	6	
Sandstone, hard bands	5	6	209	0	
Slate, sandy	1	0	210	0	
Slate, dark	3	0	213	0	
Slate, gray, to bottom	2	0	215	0	

Huling et al. Coal Test Boring No. 3 (No. 144 on Map II).

In Shady Spring District, Raleigh County, drilled by Huling et al.; authority, J. T. Lightner; from pages 298-9 of Raleigh County Report; elevation, 2805' B.

	Thickness.		Total.		
	Ft.	In.	Ft.	In.	
Clay, yellow	6	0	6	0	
Shale, blue	10	0	16	0	
Sandstone	29	0	45	0	
Slate, blue	4	0	49	0	
Sandstone	24	10	73	10	
Slate, gray	0	2	74	0	
Sandstone, dark	11	2	85	6	
Slate, gray	11	4	96	10	
Coal, Fire Creek	0	4	97	2	97' 2"
Slate	2	10	100	0	
Sandstone	1	0	101	0	
Slate, gray	1	0	102	0	
Sandstone	10	0	112	0	
Slate	14	0	126	0	
Slate, gray	15	4	141	4	
Slate, black	0	10	142	2	
Slate, gray	11	10	154	0	
Slate, black	3	0	157	0	
Slate, sandy	1	0	158	0	

	Thickness.		Total.		
	Ft.	In.	Ft.	In.	
Slate, sandy, hard bands	9	6	167	6	
Sandstone, hard	4	0	171	6	
Slate, gray, sandy	3	6	175	0	
Sandstone	10	0	185	0	
Slate, gray	2	0	187	0	
Sandstone, hard	8	6	195	6	
Slate	0	3	195	9	
Sandstone	0	6	196	3	
Coal, No. 8 Pocahontas	2	2	198	5	101′ 3″
Sandstone to bottom	3	7	202	0	

Huling et al. Coal Test Boring No. 7 (No. 145 on Map II).

In Shady Spring District, Raleigh County, on Redden Ridge, ½ mile northwest of Pear; authority, J. T. Lightner; from page 301 of Raleigh County Report; elevation, 2795′ B.

	Thickness.		Total.		
	Ft.	In.	Ft.	In.	
Clay, yellow	15	0	15	0	
Shale, sandy	6	0	21	0	
Sandstone, hard	67	3	88	3	
Coal, Fire Creek	0	7	88	10	88′ 10″
Shale	1	9	90	7	
Shale, sandy	18	5	109	0	
Shale, black	1	0	110	0	
Shale, gray	2	0	112	0	
Shale, sandy	24	0	136	0	
Shale, gray	12	4	148	4	
Shale, black	2	0	150	4	
Coal, and black slate, mixed, No. 9 Pocahontas	1	0	151	4	62′ 6″
Slate, black	2	2	153	6	
Slate, sandy	3	6	157	0	
Sandstone	13	0	170	0	
Slate, blue	2	0	172	0	
Slate with bands of sandstone	14	0	186	0	
Slate, sandy	11	0	197	0	
Slate, brown, hard bands	21	0	218	0	
Sandstone, dark	34	6	252	6	
Slate, dark, hard bands	2	6	255	0	
Sandstone	2	0	257	0	
Slate, hard bands	3	0	260	0	
Coal, No. 6 Pocahontas	0	2	260	2	108′ 10″
Slate, dark, hard bands	8	10	269	0	
Slate, gray	8	0	277	0	
Slate, black	1	3	278	3	
Coal, No. 6 Pocahontas	1	1	279	4	19′ 2″
Fire clay	0	8	280	0	
Slate, sandy, to bottom	3	0	283	0	

Huling et al. Coal Test Boring No. 2 (No. 146 on Map II).

In Shady Spring District, Raleigh County, on Redden Ridge, 0.4 mile south of Plumley Knob and 2 miles southeast of Glade Station; authority, J. T. Lightner; from pages 297-8 of Raleigh County Report; elevation, 2830′ B.

	Thickness.		Total.		
	Ft.	In.	Ft.	In.	
Clay, yellow	15	0	15	0	
Sandstone, shale partings ...... 8′ 0″					
Sandstone ...... 10 0 **Upper Raleigh**	63	0	78	0	
Sandstone, **coal** partings 9 0					
Sandstone, hard. 36 0					
Slate, coal partings, Little Raleigh	1	0	79	0	79′ 0″
Slate, sandy	5	0	84	0	
Sandstone, slate partings	18	0	102	0	
Sandstone, **Lower Raleigh**	63	0	165	0	
Slate, sandy	1	8	166	8	
Coal, Beckley?	0	4	167	0	88′ 0″
Sandstone, dark	10	0	177	0	
Sandstone, hard, white	2	0	179	0	
Slate, dark	4	0	183	0	
Slate, black	1	0	184	0	
Slate, gray	10	0	194	0	
Slate, black, hard partings	1	0	195	0	
Slate	3	0	198	0	
Slate, black	1	5	199	5	
Coal, Fire Creek (2627′ B.)	4	3	203	8	36′ 8″
Slate, dark	5	4	209	0	
Slate, light, sandy	16	0	225	0	
Slate, sandy	2	0	227	0	
Sandstone	35	0	262	0	
Slate, dark	2	0	264	0	
Coal, Little Fire Creek	0	3	264	3	60′ 7″
Fire clay	1	9	266	0	
Slate	4	0	270	0	
Slate, black	1	0	271	0	
Sandstone	7	0	278	0	
Slate, light, dark bands	10	0	288	0	
Slate, black	2	3	290	3	
Coal .... 1′ 8″					
Slate, black.... 2 0 **No. 8**					
Coal .... 0 3 **Pocahontas.**	4	7	294	10	30′ 7″
Slate, dark, to bottom	4	2	299	0	

Huling et al. Coal Test Boring No. 4 (No. 147 on Map II).

In Shady Spring District, Raleigh County, on north end of Redden Ridge, 1.5 miles southeast of Glade Station; authority, J. T. Lightner; from page 299 of Raleigh County Report; elevation, 2755' B.

	Thickness.		Total.		
	Ft.	In.	Ft.	In.	
Soil	3	0	3	0	
Sandstone, hard, **Lower Raleigh**	50	0	53	0	
Coal, Beckley	1	0	54	0	54' 0"
Slate, brown	3	0	57	0	
Slate, blue, **coal** partings	5	6	62	6	
Slate, blue, hard bands	18	0	80	6	
Slate, black	2	6	83	0	
Slate, gray	7	0	90	0	
Sandstone	21	0	111	0	
Sandstone, occasional **coal** partings	35	6	146	6	
Slate, blue	0	6	147	0	
Slate, dark	2	7	149	7	
Coal, Fire Creek	5	0	154	7	100' 7"
Fire clay, to bottom	1	5	156	0	

Huling et al. Coal Test Boring No. 1 (No. 148 on Map II).

In Shady Spring District, Raleigh County, on east side of Glade Creek, 1.25 miles southeast of Glade Station; authority, J. T. Lightner; from pages 296-7 of Raleigh County Report; elevation, 2760' B.

	Thickness.		Total.		
	Ft.	In.	Ft.	In.	
Clay, yellow	4	0	4	0	
Sandstone, **Lower Raleigh**	51	0	55	0	
Slate	3	0	58	0	
Sandstone	4	0	62	0	
Slate	3	0	65	0	
Sandstone	2	6	67	6	
Slate	5	0	72	6	
Coal, Beckley	1	1	73	7	73' 7"
Sandstone, **coal** partings	6	5	80	0	
Slate, sandy	25	0	105	0	
Slate, dark	25	0	130	0	
Sandstone	3	2	133	2	
Coal	0	1	133	3	59' 8"
Sandstone	8	9	142	0	
Shale	0	6	142	6	
Sandstone	4	6	147	0	
Slate, sandstone seams	3	0	150	0	
Slate, sandy and sandstone partings	18	0	168	0	
Sandstone, hard bands	9	0	177	0	
Sandstone	2	0	179	0	
Coal, Fire Creek	0	10	179	10	46' 7"
Slate	18	2	198	0	
Sandstone	20	0	218	0	
Sandstone, **coal** partings, **No. 9 Pocahontas**	19	0	237	0	

			Thickness.		Total.		
			Ft.	In.	Ft.	In.	
Slate, dark			20	2	257	2	
Coal, No. 7 Pocahontas			1	0	258	2	78′ 4″
Slate, black			0	4	258	6	
Slate, sandy, with sandstone bands			26	6	285	0	
Slate, light			5	0	290	0	
Slate, dark, mixed with **coal**			1	0	291	0	
Fire clay			0	9	291	9	
Coal	0′ 1″	**No. 6 Pocahontas.**	7	0	298	9	40′ 7″
Slate	0 2						
Slate, black	0 5						
Coal	1 2						
Slate, black	0 10						
Coal	1 8						
Slate, black	1 0						
Coal	0 2						
Slate, black	1 0						
Coal	0 6						
Sandstone, to bottom			3	3	302	0	

Huling et al. Coal Test Boring No. 6 (No. 149 on Map II).

In Shady Spring District, Raleigh County, 1.35 miles southeast of Glade Station; authority, J. T. Lightner; from page 300 of Raleigh County Report; elevation, 2800′ B.

			Thickness.		Total.		
			Ft.	In.	Ft.	In.	
Clay			5	0	5	0	
Sandstone, shale partings	4′ 0″	**Upper Raleigh**	44	4	49	4	
Sandstone	40 4						
Coal, Little Raleigh "A"			0	3	49	7	49′ 7″
Slate, sandy			13	2	62	9	
Coal, Little Raleigh			0	4	63	1	13′ 6″
Slate, sandy			9	11	73	0	
Sandstone			2	0	75	0	
Slate, sandy, sandstone, bands			17	0	92	0	
Slate, sandy			8	0	100	0	
Sandstone	35′ 0″	**Lower Raleigh**	45	0	145	0	
Sandstone, conglomerate	2 0						
Sandstone	7 0						
Slate, black	1 0						
Coal	0′ 2″	**Beckley "Rider"**	4	3	149	3	86′ 2″
Slate, black	3 10						
Coal	0 3						
Slate			11	0	160	3	
Coal	0′ 1″	**Beckley.**	0	9	161	0	11′ 9″
Slate	0 2						
Coal	0 6						
Slate			4	0	165	0	
Slate, sandy	31′ 0″	**Quinnimont**	32	0	197	0	
Slate, black	1 0						
Coal, small shale partings, **Fire Creek**			2	7	199	7	38′ 7″
Slate, sandy, to bottom			1	5	201	0	1′ 5″

New River Collieries Company Coal Test Boring No. 2 (No. 151 on Map II).

In Shady Spring District, Raleigh County, at Grandview; authority, New River Collieries Company; from pages 24-5 of Volume II(A) and pags 296 of Raleigh County Report; elevation, 2509' L.

			Thickness. Ft.	In.	Total. Ft.	In.	
Surface			2	3	2	3	
Sandstone, **Upper Raleigh**			60	0	62	3	
Coal, Little Raleigh			0	4	62	7	62' 7"
Fire clay			6	6	69	1	
Slate and fire clay			1	3	70	4	
Sandstone	17' 11"	**Lower Raleigh.**	94	0	164	4	
Slate, sandy	2 10						
Sandstone	51 11						
Slate, sandy	2 9						
Sandstone	17 7						
Slate	1 0						
Coal, Beckley			0	10	165	2	102' 7"
Fire clay and bastard limestone			5	9	170	11	
Slate, sandy			12	7	183	6	
Sandstone and sandy slate			12	0	195	6	
Slate			1	0	196	6	
Shale, green, sandy			5	3	201	9	
Sandstone			11	9	213	6	
Shale, green, and sandy slate			1	8	225	2	
Sandstone and sandy slate			18	5	243	7	
Sandy slate and sandstone			23	7	267	2	
Slate, sandy			1	8	268	10	
Slate			10	11	279	9	
Coal, Fire Creek			2	4	282	1	116' 11"
Fire clay			8	5	290	6	
Sandstone			30	9	321	3	
Coal, Little Fire Creek			0	6	321	9	39' 8"
Slate and sandstone	9' 4"	**Pineville**	20	6	342	2	20' 6"
Sandstone and slate, to bottom	11 2						

The detailed log of the **Royal No. 1 Coal Test Boring—No. 150 on Map II**—located in the northern edge of Raleigh County, 1.4 miles due south of Royal, just on the west side of the second-class road, is published in Chapter IV in connection with the Grandview-Royal Section, pages 209-10.

MINABLE COALS OF THE ALLEGHENY SERIES.

As shown in Figure 3, page 386, only two coal beds of the Allegheny Series appear to attain minable dimensions and purity; viz, the Middle Kittanning ("North Coalburg") and the No. 5 Block (Lower Kittanning). These will now be discussed in descending order.

THE MIDDLE KITTANNING ("NORTH COALBURG") COAL.

The Middle Kittanning ("North Coalburg") Coal, described briefly in Chapter V, pages 226-7, attains minable dimensions apparently throughout its entire area in Fayette as exhibited on Figure 5. The latter shows it confined to the western portion of the County in Falls and Kanawha Districts. It has been prospected considerably in the former area and mined commercially at a single operation in the latter. Like the No. 5 Block bed, 60 to 90 feet lower in the measures, it has a great reputation as a steam and domestic fuel; in fact it is very similar in chemical composition and calorific value as shown by the following average results taken from page 775 of the Braxton-Clay Report of the State Survey:

Proximate.	Per cent.	Ultimate.	Per cent.
Moisture	2.39	Carbon	78.51
Volatile Matter	36.23	Hydrogen	4.77
Fixed Carbon	54.72	Oxygen	8.15
Ash	6.66	Nitrogen	1.14
		Sulphur	0.77
Total	100.00	Ash	6.66
Sulphur	0.77		
Phosphorus	0.007	Total	100.00

Calorimeter B. T. U. per lb............13,646
Calculated B. T. U. per lb..............13,773
Carbon, divided by oxygen plus ash, equals 5.66, or fuel ratio.

Kanawha District.

In Kanawha District, the Middle Kittanning (North Coalburg) Coal is confined to several scattered areas near the ridge summits in the northwest half, as shown on Figure 5. The following commercial mine, examined by the author, is the only one on this bed in the County and is the only opening on it examined in the District:

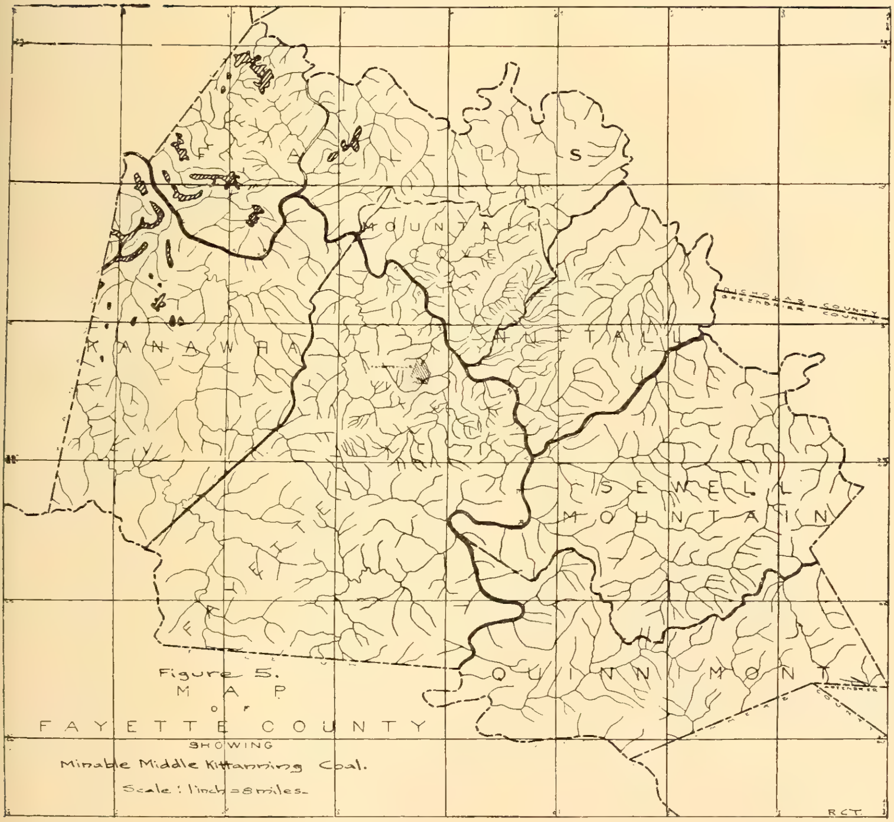


Figure 5.
MAP
of
FAYETTE COUNTY
SHOWING
Minable Middle Kittanning Coal.
Scale: 1 inch = 8 miles.

W. R. Johnson "Crescent" Mine—No. 1 on Map II.

On south hillside of Kanawha River, at Crescent; **Middle Kittanning (No. 6 Block) Coal**; elevation, 1560′ B.

			Feet.	Inches.
Sandstone, roof (no draw slate) coarse, grayish-white, pebbles not abundant, visible			15	0
Coal, splint, 6″ to	0′	8″		
Bone	0	2		
Coal, splint	2	7		
Coal, gas, medium-softt	0	8	4	1
Interval to No. 5 Block Coal, reported by Vernon Ware, a miner, in a boring sunk to drain the No. 6 Block (Middle Kittanning)			50	0

"19 miners employed, including 2 drivers and 4 outside men; total, 23 men. Output about 90 short tons; shipped east to Richmond and Newport News, Virginia, for steam, C. & O. Railway, mostly; men claim best ever used in locomotives; authority for mine data, Thomas Pierce, Foreman. Mined with picks in bottom gas coal, but shoot mostly off the solid. Many breaks and drops of sandstone roof on account of No. 5 Block Coal being mined out."

The stratigraphic position of the coal at the above mine is exhibited in the Crescent Section, published in Chapter IV, page 144.

Falls District.

In Falls District, the Middle Kittanning (North Coalburg) Coal is represented by several scattered areas near the ridge summits in the western half, as shown on Figure 5. Here it has never been mined commercially but it has been prospected considerably along the dividing ridge between the waters of Smithers Creek and Gauley River. The six following openings on it were examined by Teets:

John Oiler Coal Opening—No. 266 on Map II.

On south hillside of Bells Creek, 1.8 miles northwest of Dixie; **Middle Kittanning Coal**; elevation, 1390′ B.

			Feet.	Inches.
Sandstone, massive, coarse-grained, visible			10	0
Coal, gray splint	2′	3″		
Bone	0	6		
Coal	0	9		
Slate	0	2		
Coal (slate floor)	1	2	4	10

The stratigraphic position of the bed at the above opening is exhibited in the House Branch of Bells Creek Section, published in Chapter IV, page 136. The latter shows it belonging about 80 feet below the Upper Kittanning ("Queen Shoals") Coal and 135 to 140 feet above the Kanawha Black Flint.

Charles Flint Coal Opening—No. 267 on Map II.

On head of Smith Branch of Bells Creek, 2 miles northwest of Belva; **Middle Kittanning Coal**; elevation, 1525' B.

			Feet.	Inches.
Sandstone, massive, medium-grained, visible			30	0
Coal, croppy	1'	1"		
Slate, black	0	1		
Coal, croppy	0	9		
Slate, black	0	1		
Coal, visible	0	6	2	6
Concealed by water				

The above opening belongs 160 feet above the crop of the Kanawha Black Flint at an exposure in the hill road, less than one-fourth mile northeastward.

Alexander Wiseman Coal Opening—No. 268 on Map II.

On head of Smithers Creek, 2.4 miles N. 75° W. of Belva; **Middle Kittanning Coal**; elevation, 1500' B.

			Feet.	Inches.
Sandstone, massive, visible			5	0
Coal, splint	2'	2"		
Bone	0	4		
Coal, splint	0	8		
Slate	0	1		
Coal, splint (slate floor)	1	3	4	6

John Tucker Coal Opening—No. 269 on Map II.

On head of Smithers Creek, ¼ mile south of No. 268; **Middle Kittanning Coal**; elevation, 1550' B.

			Feet.	Inches.
Sandstone, massive				
Coal	2'	0"		
Bone	0	6		
Coal	0	8		
Slate	0	3		
Coal, splint (slate floor)	1	2	4	7

Alexander Dosier Coal Opening—No. 270 on Map II.

On Pack Branch of Smithers Creek, 2 miles N. 85° W. of Belva; **Middle Kittanning Coal**; elevation, 1590′ B.

			Feet.	Inches.
Sandstone				
Coal, splint	0	9		
Bone	0	5		
Coal, splint	0	9		
Slate	0	2		
Coal, splint (slate floor)	1	0	4	7

W. L. Chapman Coal Opening—No. 271 on Map II.

On east hillside of House Branch, 0.8 mile northeast of No. 268; **Middle Kittanning Coal**; elevation, 1470′ B.

			Feet.	Inches.
Coal, splint (sandstone roof)	2′	1″		
Bone	0	5		
Coal	0	9		
Slate	0	1		
Coal, (slate floor)	1	2	4	6

All the foregoing openings belong just above the great East Lynn Sandstone ledge, 75 to 80 feet above the No. 5 Block Coal, and 140 to 160 feet above the Kanawha Black Flint, the latter member being in typical development in this region.

Quantity of Middle Kittanning (North Coalburg) Coal Available.

Based on all the evidence gathered as regards this bed and a planimetric determination of the area by A. M. Hagan from Map II as limited on Figure 5, the following estimate is made by the author for the amount of Middle Kittanning (North Coalburg) Coal in Fayette County:

Probable Amount of Middle Kittanning ("North Coalburg") Coal.

District.	Thickness of Coal Assumed, Feet	Square Miles.	Acres.	Cubic Feet of Coal.	Short Tons of Coal.
Falls	4	1.30	832	144,967,680	5,798,706
Kanawha	4	1.00	640	111,513,600	4,460,544
Totals for County		2.30	1472	256,481,280	10,259,250

NO. 5 BLOCK—LOWER KITTANNING COAL.

The No. 5 Block—Lower Kittanning Coal, described briefly in Chapter V, pages 228-9, appears to attain minable dimensions practically throughout the region of its occurrence in Fayette, being confined to the northwest portion of the County as exhibited on Figure 6 and Map II, the latter showing its detailed outcrop. It will now be discussed by magisterial districts.

Falls District.

In Falls District, the No. 5 Block—Lower Kittanning Coal is confined to near the ridge summits in the western half. Its stratigraphical position is shown in the sections published in Chapter IV for Cannelton, and Harewood, pages 119 and 124, respectively. The two following openings in this District were examined by Teets:

Kanawha & Hocking Coal & Coke Company (Abandoned) Coal Opening—No. 2 on Map II.

Located ¼ mile north of Harewood; **No. 5 Block—Lower Kittanning Coal**; elevation, 1675′ B.

	Feet.	Inches.
Coal, opening abandoned, fallen shut, reported..	5	0

At the above opening this bed belongs only 62 feet above the Kanawha Black Flint, as exhibited in the Harewood—¼ Mile North Section, published in Chapter IV, page 124.

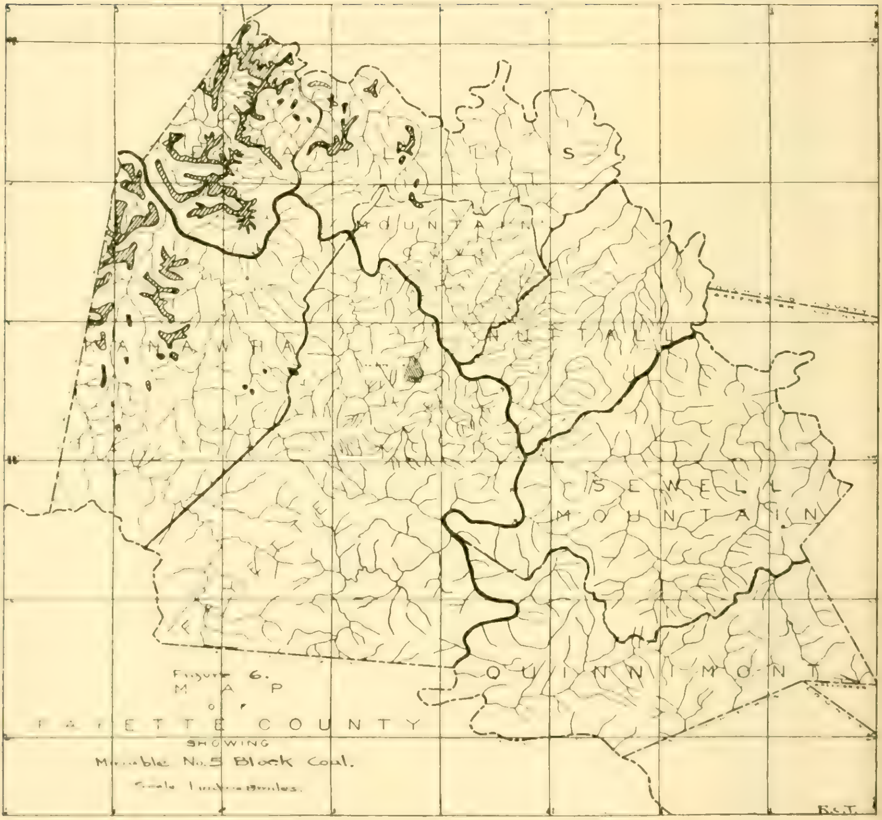


Figure 6.
MAP
of
FAYETTE COUNTY
SHOWING
Minable No. 5 Block Coal.
Scale 1 inch = 8 miles.

A. P. Holdren Coal Opening—No. 272 on Map II.

Located 0.8 mile northeast of Marting near hill road; **No. 5 Block—Lower Kittanning Coal**; elevation, 1650′ B.

	Feet.	Inches.
Coal, opening fallen shut, reported	5	0
Interval to **Kanawha Black Flint**	75	0

The above opening belongs only 75 feet above the crop of the Kanawha Black Flint, as opposed to double this interval above the latter stratum for the Middle Kittanning (North Coalburg) bed prevailing two miles northward at Openings Nos. 266-270 on Map II, described on preceding pages.

Mountain Cove District.

In Mountain Cove, the No. 5 Block—Lower Kittanning Coal is confined to a small patch of about 50 acres in the northern edge of the District, as exhibited on Map II and Figure 6. No openings were observed on it but its stratigraphic position here is exhibited in the Ansted—Hawks Nest Section, published in Chapter IV, page 170.

Kanawha District.

In Kanawha, the No. 5 Block—Lower Kittanning Coal has been mined extensively on a commercial scale, its outcrop being confined high up near the ridge summits as shown on Map II and Figure 6. Its thickness and stratigraphic position are exhibited in the sections published in Chapter IV for Crescent, Morris Creek, Schuyler Fork, Eagle—½ Mile South, Mt. Carbon, Powellton, and Kingston, pages 144, 146, 146, 146, 147, 158, and 166, respectively. The eight following mines on this bed in Kanawha District were examined by the author:

W. R. Johnson (Crescent) Mine—No. 3 on Map II.

On southwest hilside of Kanawha River, at Crescent; **No. 5 Block—Lower Kittanning Coal**; elevation, 1490′ B.

			Feet.	Inches.
Sandstone, medium-grained, visible			15	0
Shale, dark and buff, sandy, 6′ 0″ to			8	0
Coal, left up	1′	0″		
Slate	0	3		
Coal	0	11		
Slate	0	1		
Coal, block	5	2	7	5

The coal has all been mined out at this opening and the old workings are being used as a drainway for Mine No. 1 in the Middle Kittanning—"No. 6 Block" Coal 60 feet above.

The section of the coal as given above is as measured by A. P. Brady and previously published by I. C. White in Volume II, page 320, and Volume II(A), pages 527-8, of the Survey, and the analysis of a sample collected at this mine as published in the citations mentioned is given under **No. 3** in Table 1 of coal analyses at the end of this Chapter. Its stratigraphic position with respect to the Middle Kittanning—North Coalburg Coal and the Kanawha Black Flint is exhibited in the Crescent Section in Chapter IV, page 144.

Carver Bros. (Abandoned) Mine—No. 4 on Map II.

On southwest hillside of Kanawha River, ½ mile northwest of Eagle; **No. 5 Block—Lower Kittanning Coal**; elevation, 1639′ L.

			Feet.	Inches.
Sandstone				
Coal			0	3
Slate, 10′ 0″ to			20	0
Coal, gas	1′	7″		
Slate	0	1½		
Coal, black	5	10	7	6½

The section of the coal as given above is as measured by A. P. Brady and previously published by I. C. White in Volume II, page 319, and Volume II(A), page 527, of the Survey, and the analysis of a sample collected at this mine as published in the citations mentioned is given under **No. 4** in Table 1 of coal analyses by the West Virginia Geological Survey at the end of this Chapter. The slate parting that usually separates the two main benches of the No. 5 Block bed in this region occurs near the top, while for the Middle Kittanning—North Coalburg Coal the opposite is true, the slate parting between the two main benches belonging near the bottom, as shown in the sections for the latter seam on preceding pages of this Chapter at Openings Nos. 266-270 on Map II.

Mecca Colliery Co. Mine—No. 5 on Map II.

On east side of Morris Creek, 0.4 mile southeast of Donwood; **No. 5 Block—Lower Kittanning Coal**; elevation, 1575' B.

			Feet.	Inches.
1. Sandstone, hard				
2. Slate and **coal**, mixed			0	7
3. **Coal**, splint	0'	9"		
4. Black band iron ore, hard on picks	0	1		
5. **Coal**, splint	2	8		
6. **Coal**, soft, gas	0	2		
7. **Coal**, splint	2	9½	6	5½
8. Slate and concealed (reported)			58	0
9. **Kanawha Black Flint** (reported)			2	0

"Butts, N. 81° E.; faces, S. 9° E.; greatest rise, S. 40° E.; mine capacity, 550 tons; men employed, 75; coal shipped east and west for steam and domestic purposes; sample collected from Nos. 3, 5, 6, and 7."

The section of the coal as given above is as previously measured by the author and published by I. C. White in Volume II(A), pages 540-1, of the Survey, the analysis of the sample collected being published on page 528, in table No. 9, under No. 17, and republished in Bulletin 2, page 297, under No. 17. This analysis is republished under **No. 5** in Table 1 of coal analyses at the end of this Chapter. This mine has been closed down for 3 years. The wire cable is still on drum and incline. The mine was formerly operated by Carver Brothers. The stratigraphic position of the coal is exhibited in the Schuyler Fork Section in Chapter IV, page 146.

Eureka Coal Company Mine No. 14—No. 6 on Map II.

On east side of Morris Creek, ¾ mile south of Donwood; **No. 5 Block—Lower Kittanning Coal**; elevation, 1590′ B.

			Feet.	Inches.
Sandstone				
Draw slate			0	6
Coal, hard, block	0′	8½″		
Slate	0	1		
Coal, hard, block	4	0		
Coal, gas	0	10	5	7½

The section of the coal as given above is as previously measured by A. P. Brady and published by I. C. White in Volume II, page 320, and Volume II(A), page 528, and the analysis of the sample collected at this mine as analyzed by Prof. Hite and published in the citations mentioned is given under **No. 6** in Table 1 of coal analyses at the end of this Chapter. At the time the mine was sampled it was being operated by the Davis Gordon Company.

The author also measured a section of the coal at this mine in 1907 and sampled the same, as published by Dr. White on page 541 of Volume II(A), the analysis being published under No. 18 in table No. 9 on page 528 and republished under No. 18 on page 298 of Bulletin 2 of the Survey, as follows:

			Feet.	Inches.
1. Sandstone, massive				
2. Slate, "draw," thin streaks of **coal**, 1″ to			2	0
3. **Coal**, slaty, 2″ to	0′	5″		
4. **Coal**, splint	0	5		
5. Niggerhead	0	1		
6. **Coal**, gray splint, hard	1	0		
7. **Coal**, semi-splint, with 4″ gas coal at bottom	1	1		
8. **Coal**, splint	2	5		
9. Slate	1	4		
10. **Coal**, gas, reported by Mr. Hansford	0	4	7	1
11. Sandstone, massive and concealed			65	0
12. **Kanawha Black Flint**			6	0

"Butts, E. 60° E.; faces, N. 30° E.; greatest rise, S. 35° E.; mine capacity, 330 tons; men employed, 63; coal shipped east and west and south for steam and domestic purposes; authority for mine data, Morris Hansford, Superintendent; sample from Nos. 3, 4, 6, 7, and 8."

The above mine at the time of the writer's first visit in 1907 was being operated by the Eureka Colliery Company;

subsequently by the Morris Creek Coal Co., and now by The Eureka Coal Company. The analysis of this sample is also given under **No. 6** in Table 1 of coal analyses at the end of this Chapter.

Eureka Coal Co. Mine No. 5—No. 7 on Map II.

On Morris Creek and County Line, 1¼ miles south of Donwood; **No. 5 Block—Lower Kittanning Coal**; elevation, 1615′ B.

	Feet.	Inches.
Sandstone, massive, coarse, brown, making cliff, no pebbles seen	30	0
Concealed	10	0
Sandstone, grayish-white, making cliff, no pebbles seen, **Upper East Lynn**	75	0
Concealed	25	0
Sandstone, grayish-white, making cliff, **East Lynn**	60	0
Coal, No. 5 Block	5	0
Interval to **Kanawha Black Flint**	70	0

The following section was measured at the entrance of the above mine, which started operations in July, 1915:

			Feet.	Inches.
Sandstone, grayish-white, cliff, **East Lynn**			50	0
Slate, black, 6′ 0″ to			0	0
Coal, splint, hard	2′	3″		
Coal, gas	0	2		
Coal, splint, hard	2	1		
Coal, semi-splint (slate floor)	0	8	5	2

St. Clair Coal & Mining Co. (Archer) Mine—No. 8 on Map II.

On southwest hillside of Kanawha River, opposite Harewood; **No. 5 Block—Lower Kittanning Coal**; elevation, 1725′ B.

			Feet.	Inches.
Slate, draw			0	6
Coal, splint	1′	6″		
Slate, dark-gray	0	2		
Coal	3	7	5	3
Slate				

"Output, 250 short tons daily, 9 hours; employ 30 men inside and outside; mule haulage; ship mostly east; lump for domestic fuel; nut and slack shipped for steam purposes; incline is 2300 feet long; authority for mine data, E. Forbes, Foreman."

The above section was given the writer by R. R. Barton, Engineer for Boomer Coal & Coke Co., which has operated this mine since 1916 under the name mentioned above. This mine was opened in 1911 by the St. Clair Colliery Company.

The following section was measured by the author at the above mine:

				Feet.	Inches.
Sandstone				15	0
Shale, dark, sandy, 4′ 0″ to				5	0
Sandstone				5	0
Shale, black, plant fossils abundant				2	0
Coal, gas, medium-hard	1′	2″			
Coal, splint, hard	0	8			
Bone	0	1			
Coal, splint, hard	3	0			
Coal, gas, medium-hard, (sandstone, hard, pavement)	0	8	No. 5 Block	5	7

The stratigraphic position of the coal at the above opening is exhibited in the Eagle—½ Mile South Section in Chapter IV, page 146.

Great Kanawha Colliery Co. (Mt. Carbon) Mine—No. 9 on Map II.

On east hillside of Armstrong Creek, ½ mile southeast of Kimberly; **No. 5 Block—Lower Kittanning Coal**; elevation, 2060′ B.

				Feet.	Inches.
Sandstone					
Coal	1′	4″			
Fire clay	0	4			
Coal, block	0	8			
Slate, trace	.....				
Coal, block	6	0	.....	8	4

The section of the coal as given above is as measured by A. P. Brady and previously published by I. C. White in Volume II, page 319, and Volume II(A), pages 526-7, and the analysis of a sample collected at this mine, as reported by Prof. Hite, in the citations noted above, is republished under No. 9 in Table 1 of coal analyses at the end of this Chapter. The coal was mined out and the mine abandoned 15 to 20 years ago.

M. B. Coal & Coke Co. (Columbia) Mine—No. 10 on Map II.

On west hillside of Armstrong Creek, ½ mile west of Columbia; **No. 5 Block—Lower Kittanning Coal**; elevation, 1865′ B.

			Feet.	Inches.
1. Sandstone				
2. Bone	0′	3″		
3. **Coal**, splint	1	0		
4. **Coal** and slate, interlaminated	1	0		
5. Shale, gray	0	2		
6. **Coal**, splint, hard	5	4		
7. **Coal**, gas (slate floor)	0	4	8	1

"Output, 200 short tons per day of 9 hours; men employed. inside and outside, about 40; main office, Charleston, W. Va."

This mine was opened by the present operating company about 1907. Mr. Samuel Blithers, drum runner, says that No. 4 of section reaches 9 feet of gray slate with 1 foot of good coal above and Nos. 6 and 7 remain normal, about 6 feet in thickness. The position of the bed is shown in the Columbia Section, page 152.

Quantity of No. 5 Block (Lower Kittanning) Coal Available.

Based on all the evidence gathered in the field and a planimetric determination of the area by A. M. Hagan from Map II, as limited on Figure 6, the following estimate is made by the author for the amount of No. 5 Block (Lower Kittanning) Coal available in Fayette County:

Probable Amount of No. 5 Block Coal.

District.	Thickness of Coal Assumed. Feet.	Square Miles.	Acres.	Cubic Feet of Coal.	Short Tons of Coal.
Falls	5	8.12	5,196.8	1,131,863,040	45,274,522
Mountain Cove	5	0.08	51.2	11,151,360	446,054
Kanawha	5	2.91	1,862.4	405,530,720	16,225,229
Totals for County		11.11	7,110.4	1,548,645,120	61,945,805

MINABLE COALS OF THE KANAWHA GROUP, POTTSVILLE SERIES.

As shown on Figure 3, page 386, there are 14 different coal beds of the Kanawha Group of the Pottsville Series that appear to attain minable dimensions and regularity in Fayette County; viz, Stockton, Coalburg, Winifrede, Chilton, Cedar Grove, Alma, Peerless, No. 2 Gas, Powellton, Eagle, Little Eagle, Glenalum Tunnel, Gilbert, and Douglas in descending order. These will be further discussed in the order given.

THE STOCKTON COAL.

The Stockton Coal, described briefly in Chapter VI, pages 234-235, apparently attains minable dimensions and regularity practically throughout the entire area of its occurrence, as exhibited on Figure 7, page 472. The latter shows it confined to several scattered patches near the ridge summits in Kanawha District, the western two-thirds of Falls; the northwestern border of Mountain Cove, and the western edge of Fayetteville District. This bed is not mined commercially in the County but it has been prospected to some extent by the large land-holding companies. The following average results compiled by R. C. Tucker from 6 different samples in the State give a fair idea of its chemical composition and calorific value:

	Per cent.
Moisture	1.68
Volatile Matter	33.22
Fixed Carbon	57.24
Ash	7.86
Total	100.00
Sulphur	1.11
Phosphorus	0.016
Calorimeter B. T. U	13,501

As in Braxton and Clay Counties, it is always multiple-bedded, carrying both gas and splint types of coal, the former predominating in the upper portion of the bed. It will now be discussed by magisterial districts.

Falls District.

In Falls District, the thickness and stratigraphic position of the Stockton Coal bed are exhibited in the sections published in Chapter IV for Cannelton, Harewood—¼ Mile Northwest, Boomer—¾ Mile East, and House Branch of Bells Creek, pages 120, 124, 126, and 136, respectively. The old **Cannel Coal Company (Abandoned) Opening—No. 273 on Map II**—located 0.2 mile due north of Cannelton, in Kanawha County; **Stockton Coal**; elevation, 1330′ B., abandoned 27 years ago, is given in connection with the Cannelton Section, page 120.

The following data were obtained by Teets at a prospect opening in the northern border of Falls District:

T. B. Craze Coal Opening—No. 274 on Map II.

On west hillside of Bells Creek, ½ mile southeast of southern point of Clay County; **Stockton Coal**; elevation, 1255′ B.

			Feet.	Inches.
Concealed				
Kanawha Black Flint			5	0
Slate, black			4	0
Coal, splint	1′	4″		
Coal, bony	0	2		
Coal, gray splint	1	6	3	0
Sandstone and slate				

Mountain Cove District.

In Mountain Cove District, the thickness and stratigraphic position of the Stockton Coal are exhibited in the Ansted—Hawks Nest Section, page 170. As shown on Figure 7, this coal is confined to a small area in the extreme northwest edge of the District, the following opening in this locality being examined by the author:

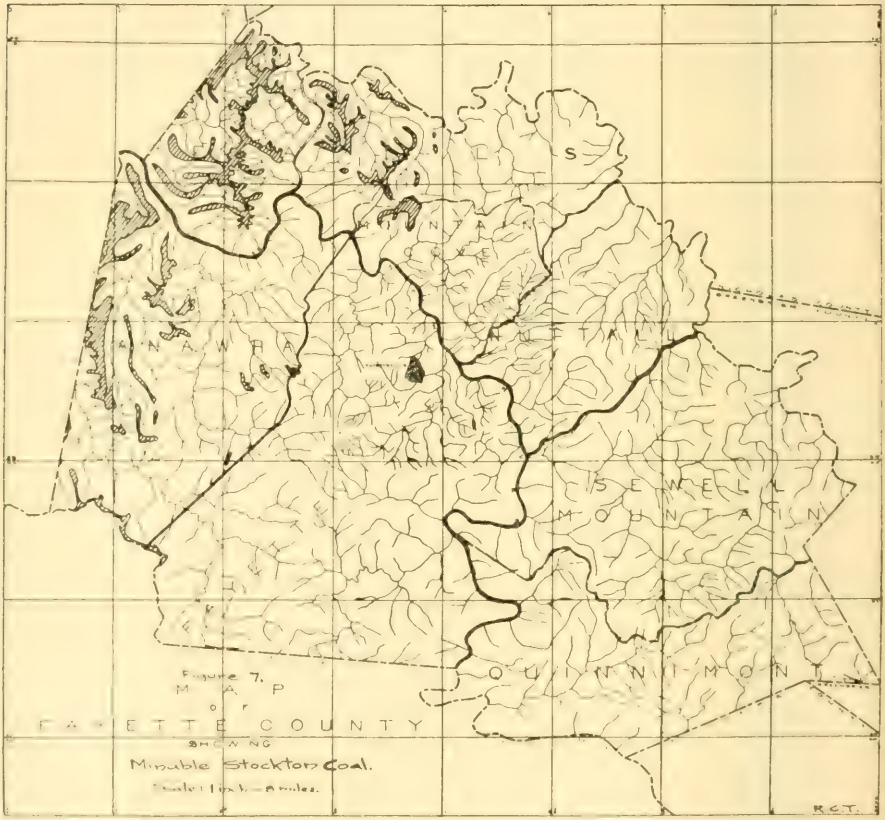


Figure 7.
MAP
of
FAYETTE COUNTY
SHOWING
Minable Stockton Coal.
Scale: 1 inch = 8 miles.

Coal Opening—No. 275 on Map II.

On east side of triangulation point knob, 1¼ miles northwest of Ansted; **Stockton Coal**; elevation, 2335′ B.

			Feet.	Inches.
Shale, dark, argillaceous, visible			10	0
Coal, gas, medium-hard	1′	8″		
Bony slate, black	0	6		
Shale, dark	0	4		
Coal, splint, slightly bony	3	0		
Coal, splint, good	3	0	8	6
Slate				

For the stratigraphic position of the Stockton Coal here, see the Ansted—Hawks Nest Section above referenced.

At **Coal Exposure—No. 276 on Map II** on west side of low gap, ¼ mile northeast of No. 275, only a heavy blossom of Stockton Coal at an elevation of 2315′ B., 10 feet below fragments of the Kanawha Black Flint was seen.

Kanawha District.

In Kanawha District, the thickness and stratigraphic position of the Stockton Coal are exhibited in the sections published in Chapter IV for Crescent, Mt. Carbon, Powellton, Page, and Kingston, pages 144, 147, 158, 162, and 166, respectively. Except in the localities of these sections, no other exposures of this bed were observed in the District, but it is believed to be present in minable thickness over practically the entire area designated for it on Figure 7.

Fayetteville District.

In Fayetteville District, the Stockton Coal, as shown on Map II and Figure 7, is confined to two small areas in the western edge, one near the summit of Ford Knob, and the other a narrow belt along the crest of Paint Mountain on the Fayette-Raleigh County Line, both probably totaling not over 100 acres. In the latter region its probable stratigraphic position is exhibited tentatively in the Potato Hill Knob Section, published on page 190, this being the only exposure observed for the bed in the District.

Quantity of Stockton Coal Available.

Based on all the evidence gathered in the field and a planimetric determination of the area by A. M. Hagan from Map II, as the bed is limited on Figure 7, the following estimate is made by the author for the amount of Stockton Coal available in Fayette County:

Probable Amount of Stockton Coal.

District	Thickness of Coal Assumed. Feet.	Square Miles.	Acres.	Cubic Feet of Coal.	Short Tons of Coal.
Falls	3	12.16	7,782.4	1,017,004,032	40,680,161
Kanawha	4	6.56	4.198.4	731,529,216	29,261.169
Mountain Cove.........	3	0.33	211.2	27,599,616	1,103,985
Fayetteville	4	0.156	100.0	17,424,000	696,960
Totals for County....	....	19.206	12,292.0	1,793.556,864	71,742,275

COALBURG COAL.

The Coalburg Coal, described briefly in Chapter VI, pages 236-239, is a very important bed, since it has been mined quite extensively in Fayette on a commercial scale. It is this seam that is worked high up on the east hillside of Gauley River southward from Wyndal. It appears to be present in minable dimensions and regularity throughout the area shown for it on Figure 8. Its detailed outcrop is exhibited on Map II. Its thickness and character at the commercial mines, prospect openings and exposures will now be described by magisterial districts.

Falls District.

In Falls, the Coalburg Coal is present in good thickness and quality, the only commercial mines on this bed in the County being in this District. Its thickness and stratigraphic position are exhibited in the sections published in Chapter IV

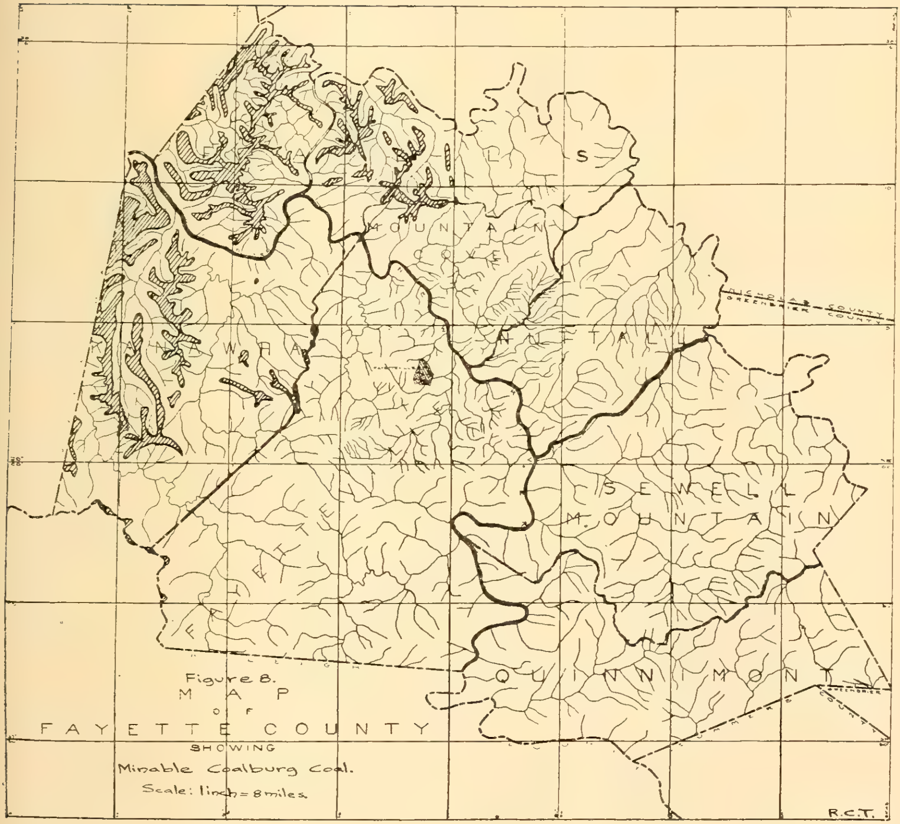


Figure 8.
MAP
OF
FAYETTE COUNTY
SHOWING
Minable Coalburg Coal.
Scale: 1 inch = 8 miles.

for Cannelton, Boomer—¾ Mile East, Gamoca, Wyndal, House Branch of Bells Creek, and Panther Mountain, all of which are referenced in the Index. The seven following openings and mines were examined by Teets:

T. B. Craze Coal Opening—No. 277 on Map II.

On southwest hillside of Bells Creek, ⅛ mile northwest of House Branch; **Coalburg Coal**; elevation, 1180′ B.

			Feet.	Inches.
Concealed and slate				
Coal	1′	0″		
Slate	0	1		
Coal	1	2		
Slate	0	1		
Coal, visible	0	9	3	1
Concealed by water				

The stratigraphic position of the Coalburg Coal at the above opening is shown in the House Branch of Bells Creek Section, page 137.

Coal Opening—No. 278 on Map II.

On west hillside of Open Fork, opposite Cambria, Nicholas County; **Coalburg Coal**; elevation, 1245′ B.

			Feet.	Inches.
Interval from **Kanawha Black Flint**			95	0
Coal, medium-hard	0′	9″		
Shale, slaty	1	1		
Coal, gray splint	1	8		
Coal, bony	0	4		
Coal, gray splint (slate floor)	2	10	6	8

Bell Creek Coal Co. (Abandoned) Mine—No. 11 on Map II.

On east hillside of Bells Creek, 1.1 miles north of Belva; **Coalburg Coal**; elevation, 1390′ B.; butts, S. 68° W.; faces, S. 22° E.

			Feet.	Inches.
Sandstone and slate				
Coal	0′	6″		
Slate	0	10		
Splint	2	3		
Bone **coal**	0	0¾		
Coal	1	8		
Slate	0	2		
Coal	0	2	5	7¾

The section as given above is as measured by A. P. Brady and previously published by I. C. White, in Volume II, page 553, while the analysis of the sample collected, as reported by Prof. Hite and published by Dr. White on page 554 of Volume II and republished under No. 10 on page 292 of Bulletin 2 of the Survey, is given under **No. 11** in Table 1 of coal analyses at the end of this Chapter.

Deitz Colliery Co. Mine—No. 12 on Map II.

On east hillside of Gauley River, ¾ mile southeast of Wyndal; **Coalburg Coal**; elevation, 1625′ B.

			Feet.	Inches.
Slate				
Coal	1′	6″		
Slate	0	1½		
Coal, gas	0	7½		
Slate, black	0	1		
Coal, splint	1	6		
Slate	0	2		
Coal, bony	0	4		
Coal, splint	0	5		
Coal, gas (slate floor)	1	0	5	9

The above mine was also examined by the author in 1907 and the results published by I. C. White on pages 463-4 of Volume II(A) as follows:

						Feet.	Inches.
1.	Sandstone, massive, visible						
2.	Slate, blue					1	2
3.	**Coal**, gas	1′	10″	2′	9¼″		
	Slate	0	0¼				
	Coal, gas	0	11				
4.	Slate, with streaks of **coal**			2	6		
5.	**Coal**, hard splint	1′	9″	6	2½		
6.	Bone, ¾″ to	0	1				
7.	**Coal**, gas	0	8				
8.	Bone, ¾″ to	0	1				
9.	**Coal**, splint	1	6				
10.	Bone, sometimes absent	0	1½				
11.	**Coal**, hard splint	0	8				
12.	Bone, almost splint **coal**	0	2				
13.	**Coal**, gas	1	2			11	5¾

"Butts, S. 80° W.; faces, N. 10° W.; greatest rise, S. 50° E.; mine capacity, 400 tons; men employed, 100; coal shipped east and west for steam and fuel purposes; authority for mine data, Theodore Deitz, Superintendent; sample from Nos. 5, 7, 9, 11 and 13, the analysis of which was published in table No. 8, page 466, of Volume II(A), under No. 23."

This analysis was republished under No. 23 on page 284 of Bulletin 2 of the Survey and is given under **No. 12** in the present Report in Table 1 of coal analyses at the end of this Chapter.

Deitz Colliery Co. Mine—No. 13 on Map II.

On branch of Gauley River, 1.6 miles S. 55° E. of Wyndal; **Coalburg Coal**; elevation, 1750′ B.

			Feet.	Inches.
Coal, gray splint (slate roof)	1′	8″		
Slate, black	0	1½		
Coal, gas	0	8		
Slate, black	0	1		
Coal, gray splint	1	6		
Slate, gray	0	2		
Coal, splint	0	9		
Coal, gas	0	11½	5	11

Midvale Colliery Co. Mine—No. 14 on Map II.

On east hillside of Gauley River, 0.4 mile southeast of Gamoca; **Coalburg Coal**; elevation, 1765′ B.

			Feet.	Inches.
Kanawha Black Flint			5	0
Concealed			36	0
Shale, sandy			12	0
Coal	2′	0″		
Slate, gray, shaly	4	0		
Coal, splint	1	9		
Slate	0	1		
Coal, soft at top	1	6		
Bone	0	5		
Coal, splint	2	1	11	10
State and concealed			40	0

The stratigraphic position of the Coalburg Coal at the above mine is exhibited in the Gamoca Section in Chapter IV, page 130.

The author also measured a section of the coal at the above mine in 1907, when it was operated by the Gamoca Coal Company, and the results were published by I. C. White on page 464 of Volume II(A) of the Survey, as follows:

			Feet.	Inches.
1. Sandstone				
2. Coal, gas	3′	0 ″		
3. Slate, with streaks of coal	1	6		
4. Coal, hard, splint	1	8		
5. Bone	0	0¾		
6. Coal, gas	0	8		
7. Bone	0	0¾		
8. Coal, splint	1	3		
9. Bone, ¾″ to (sometimes absent)	0	1		
10. Coal, splint, with gas coal at bottom	1	9	10	0½
11. Fire clay			0	4
12. Sandstone				

"Butts, N. 80° E.; faces, S. 10° E.; greatest rise, S. 50° E.; mine capacity, 500 tons; men employed, 80; coal shipped mostly east for steam and domestic purposes; authority for mine data, M. G. Campbell, Superintendent; sample from Nos. 4, 6, 8, and 10, for analysis of which see No. 24 in Table No. 8, page 466 of Volume II(A) Nos. 2 and 3 of section were not seen by the author but given him by Mr. Campbell, the Superintendent."

The analysis of this coal as given in the citation last mentioned and also republished in Bulletin 2, under No. 24, page 284, is given under **No. 14** in Table 1 of coal analyses at the end of this Chapter.

Lynchburg Colliery Co. Mine—No. 15 on Map II.

On south hillside of Sand Branch, 1.5 miles east of Vanetta; **Coalburg Coal**; elevation, 1980′ B.

			Feet.	Inches.
Coal, reported, (slate roof)			1	10
Slate, reported			2	0
Coal, gray splint	1′	9 ″		
Coal, gassy	0	8		
Slate, black	0	1		
Coal, splint	1	5½		
Bone	0	5½		
Coal, gray splint (slate floor)	1	10	6	3

Kanawha, Mountain Cove and Fayetteville Districts.

The Coalburg Coal is not mined commercially in the three districts in question, nor has it been prospected to any great extent, although it is believed to be present in minable dimensions throughout practically all the area designated for it on Figure 8. Its thickness and stratigraphic position in Kanawha are exhibited in the sections for Powellton, Page, and Kingston, pages 158, 162, and 166, respectively; for Mountain Cove District, the Ansted—Hawks Nest Section, page 170; and for Fayetteville District, the Potato Hill Knob Section, page 190. These are the only exposures of this bed observed in the three Districts in question.

Quantity of Coalburg Coal Available.

The following estimate is made by the author of the amount of Coalburg Coal available in Fayette County, based on all the evidence gathered in the field and a planimetric determination of the area by A. M. Hagan from Map II, as the bed is limited on Figure 8:

Probable Amount of Coalburg Coal.

District	Thickness of Coal, Assumed, Feet	Square Miles.	Acres.	Cubic Feet of Coal.	Short Tons of Coal.
Falls	3.5	17.46	11,174.4	1,703,649,024	68,145,961
Kanawha	4.0	9.94	6,361.6	1,108,445,184	44,337,807
Mountain Cove....	5.0	0.54	345.6	75,271,680	3,010,867
Totals for County	....	27.94	17.881.6	2,887,365,888	115,494.635

WINIFREDE COAL.

The Winifrede Coal, described briefly in Chapter VI, page 241, is believed to attain minable dimensions and regularity over the greater portion of its area as exhibited on Figure 9. Although an important bed from a commercial standpoint in the adjoining County of Kanawha, where it has long been mined, it has not been so operated in Fayette, and it has been prospected but little. However, the following average results compiled by R. C. Tucker from 25 separate

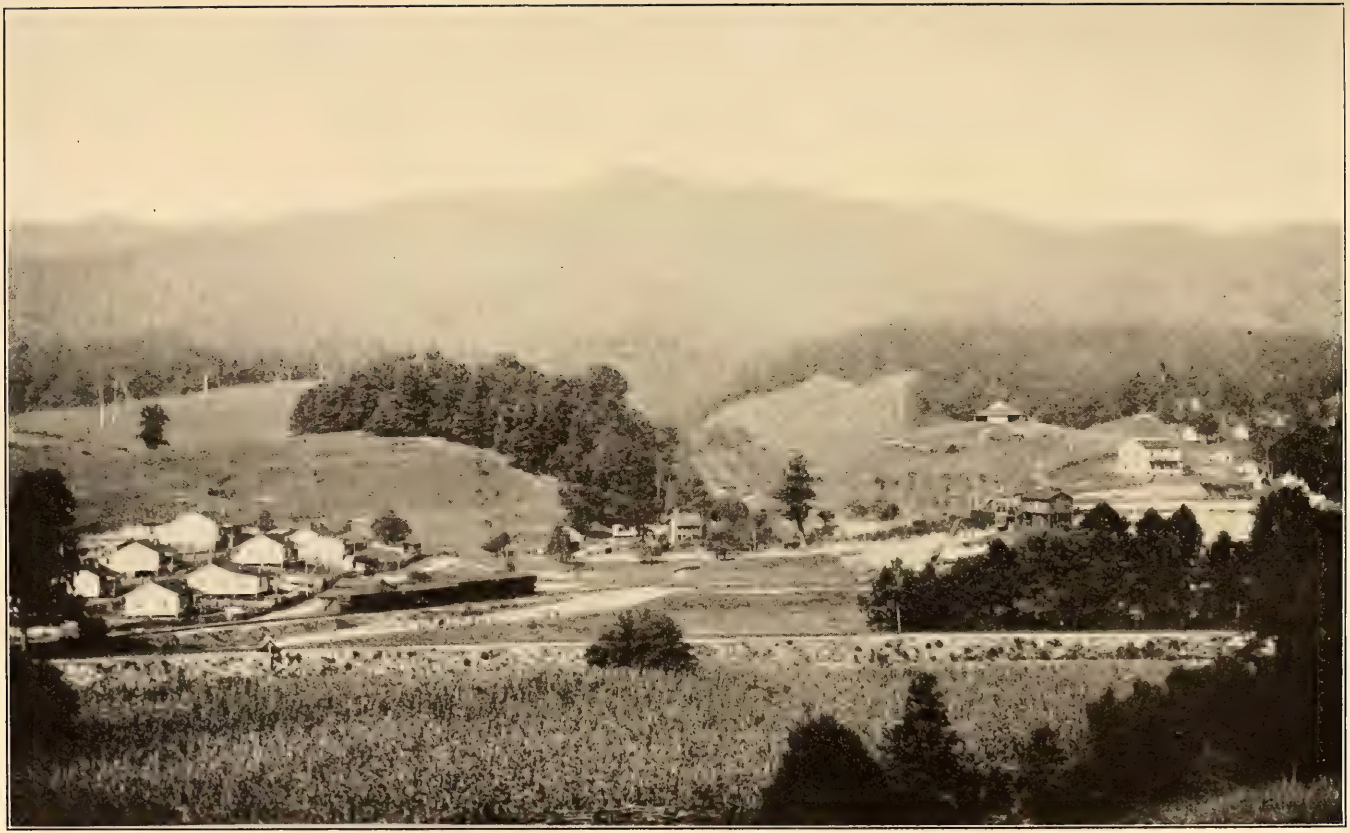


PLATE XVI.—View looking westward at Potato Hill Knob on sky-line, showing topography of Kanawha and New River Groups, Long Branch on left and coal tipple for Mine No. 55 on Map II on right.

analyses of samples in the southern portion of the State published in previous reports of the State Survey give a fair idea of its remarkable purity and calorific value:

	Per cent.
Moisture	1.25
Volatile Matter	35.21
Fixed Carbon	57.67
Ash	5.87
Total	100.00
Sulphur	0.69
Phosphorus	0.005
Calorimeter B. T. U.	14,127

The Winifrede Coal, like the Coalburg and other "splint" types of the Kanawha Group, carries such a small quantity of iron in its ash that the latter is practically white in color, a feature making its use as fuel in the manufacture of snow-white Portland Cement very desirable. The correspondingly high fusibility of their ash—above 3000° F.—also makes these types especially desirable as a steam and domestic fuel, not only on account of their high calorific value, but also for their comparatively great freedom from objectionable and expensive "clinkers" when so used.

Falls District.

In Falls District, the thickness and stratigraphic position of the Winifrede Coal are exhibited in the sections published in Chapter IV for Cannelton, Boomer—¾ Mile East and Wyndal, pages 120, 126, and 132, respectively. No prospects were observed on it in this area, the exposures in the foregoing sections being the only ones noted.

Mountain Cove District.

In Mountain Cove District, the Winifrede Coal is restricted to a small area in the northwestern border, as shown on Figure 9. No exposures or openings on it were observed, but it is believed to be present in minable dimensions. It stratigraphic position is indicated in the Ansted—Hawks Nest Section, page 171.

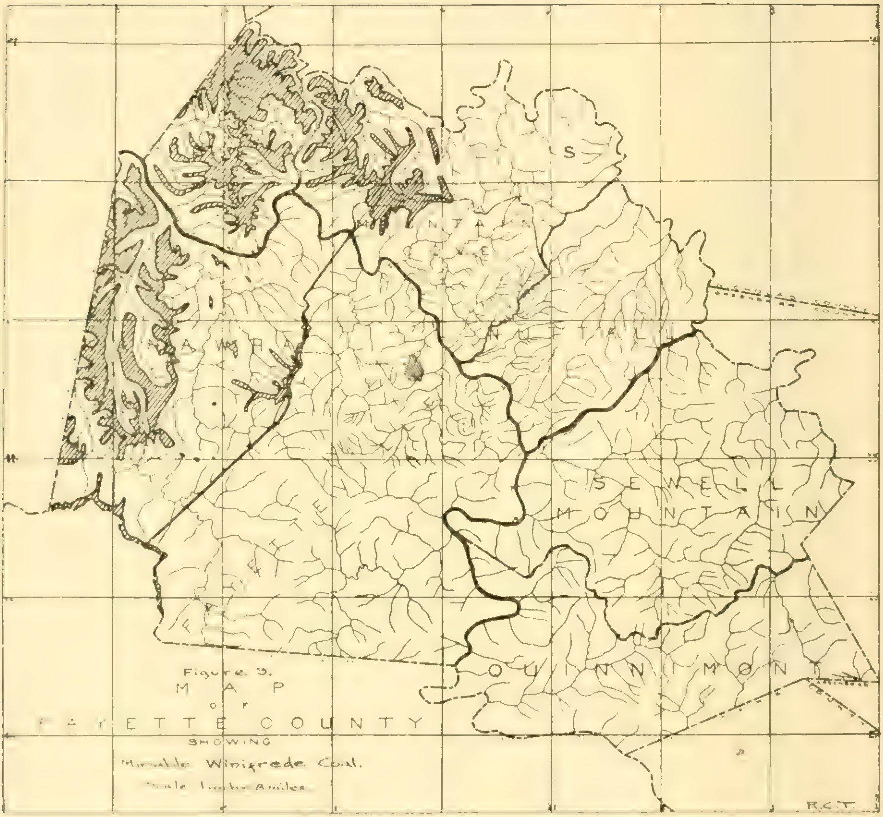


Figure 3.
MAP
OF
FAYETTE COUNTY
SHOWING
Minable Winifrede Coal.
Scale 1 inch = 8 miles
S
MOUNTAIN COVE
KANAWHA
NUTTALL
FAYETTE
SEWELL MOUNTAIN
QUINNIMONT
NICHOLAS COUNTY
GREENBRIER COUNTY
R.C.T.

Kanawha District.

In Kanawha District, the Winifrede Coal covers about two-thirds as large an area as it does in Falls, its thickness and stratigraphic position here being exhibited in the sections published in Chapter IV for Powellton, Page, and Kingston, pages 158, 162, and 166, respectively, the exposures in the foregoing sections being the only ones observed.

Fayetteville District.

In Fayetteville District, the Winifrede Coal is confined to two small areas in the western border—one 4½ miles westward from Fayetteville along the east side of the high ridge joining Big Rock and Ford Knobs, and the other on the east side of Paint Mountain along the Fayette-Raleigh County Line. Its stratigraphic position is shown in the Potato Hill Knob Section, page 190, the latter being the only exposure observed in the District.

Quantity of Winifrede Coal Available.

Based on all the evidence gathered in the field, the known character of the bed in the adjoining Counties, and a planimetric determination of the area of the bed by A. M. Hagan from Map II, as limited on Figure 9, the following estimate is made by the author of the amount of Winifrede Coal available in Fayette County:

Probable Amount of Winifrede Coal.

District.	Thickness of Coal Assumed, Feet.	Square Miles.	Acres.	Cubic Feet of Coal	Short Tons of Coal
Falls	2	24.26	15,526.4	1,352,659,968	54,106,399
Kanawha	2.5	15.91	10,182.4	1,108,863,360	44,354,534
Fayetteviille	2.5	0.17	108.8	11,848,320	473,933
Mountain Cove....	2	0.76	486.4	42,375,168	1,695.007
Totals for County	....	41.10	26,304.0	2,515,746,816	100,629,873

CHILTON COAL.

The Chilton Coal, described briefly in Chapter VI, pages 244-245, is believed to attain minable dimensions and regularity over the greater portion of its area as outlined on Figure 10. Its detailed outcrop is shown on Map II. As described on a subsequent page it has been mined commercially at only a single point in Fayette, and it has been prospected but very little. However, the following average results, compiled by R. C. Tucker from 25 different analyses published in previous State Survey Reports for mines mostly in Logan County, 25 to 30 miles southwestward, should give a fair idea of its remarkable purity and close simulation in quality to that of the Winifrede Coal as revealed by the results published on a preceding page of this Chapter from the same number of samples:

		Per cent.
Moisture		0.90
Volatile Matter		36.22
Fixed Carbon		57.23
Ash		5.65
Total		100.00
Sulphur		0.72
Phosphorus		0.006
Calorimeter B. T. U.	14,258	

Falls District.

In Falls District, the thickness and stratigraphic position of the Chilton Coal are exhibited in the sections published in Chapter IV for Boomer—¾ Mile East and Wyndal, pages 126 and 132, respectively, these being the only exposures observed for it in the area in question.

Mountain Cove District.

In Mountain Cove District, the thickness and stratigraphic position of the Chilton Coal are exhibited in the section for Ansted, this being the only exposure of it definitely recognized in the District.

Kanawha District.

In Kanawha District, the Chilton Coal appears to attain a better development than on the north side of the Kanawha River, its thickness and stratigraphic position being exhibited in the sections published in Chapter IV for Crescent, Powellton—0.5 Mile Northwest and Page, pages 145, 156, and 162, respectively. The following data were obtained by the author at the only commercial mine—now abandoned—ever opened on the Chilton bed in Fayette County:

Mt. Carbon Co. Ltd. (Excelsior) Mine—No. 16 on Map II.

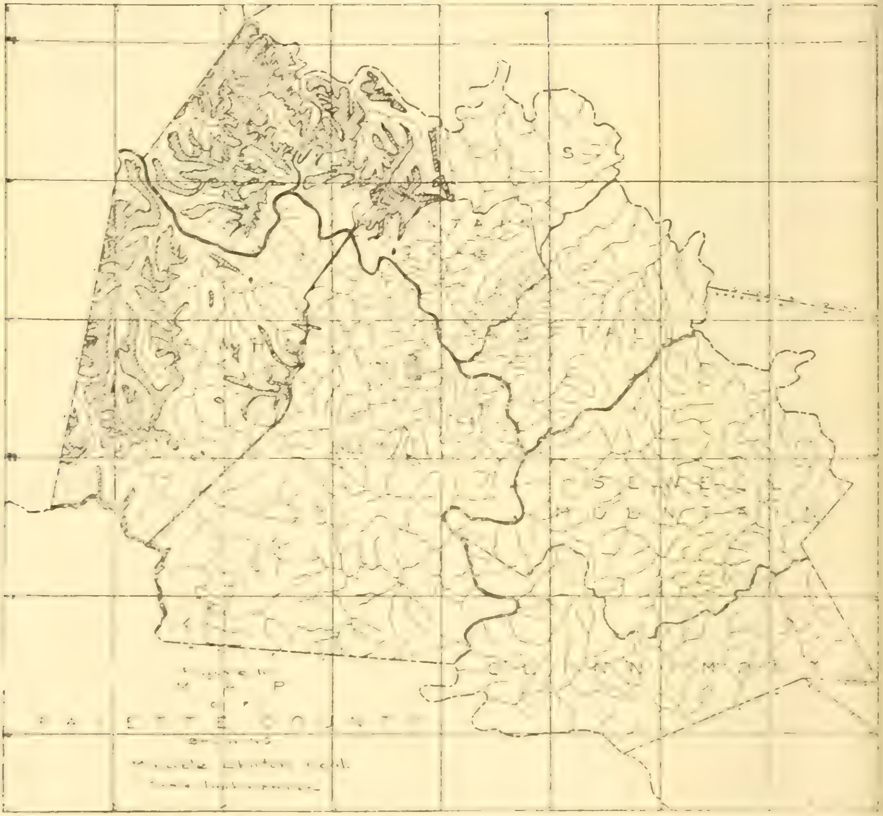
In ravine, east hillside of Armstrong Creek, ¾ mile north of Powellton; **Chilton Coal**; elevation, 1840' B.

	Feet.	Inches.
Sandstone, making cliff	40	0
Coal, semi-splint (slate floor)	3	3

Mr. G. H. Powell, General Manager of Mt. Carbon Co., says the above mine was 40 feet below the Winifrede Coal, with 4″ to 6″ of gas coal at bottom and balance splint, with total section of 4 feet, being very low in ash and clean, but abandoned (1904) partly on account of demand by United Mine Workers for Cedar Grove Coal rating in mining and on its being opened at wrong place to operate successfully.

Fayetteville District.

In Fayetteville District, the Chilton Coal is confined to narrow belts high up near the ridge summits in the extreme west and southwest borders of the District as shown on Figure 10 and Map II. In the latter region it attains a fine development as exhibited by the following data obtained by the author:


MAP
OF
FAYETTE COUNTY

Coal Prospect—No. 279 on Map II.

2½ miles northwest of Heberton, on northeast slope of Potato Hill Knob; **Chilton Coal**; elevation 2780′ B.; section by Wm. Bailey.

			Feet.	Inches.
Sandstone, coarse, gray and brown, visible......			20	0
Coal, gas, hard....................	3′	2″		
Bone	0	6		
Coal, gas, hard....................	1	6	5	2
Slate				

The opening at above prospect was closed, the section being as reported by Mr. Bailey. The stratigraphic position of the bed is exhibited in the Powellton—½ Mile Northwest Section, page 156.

Quantity of Chilton Coal Available.

Based on all the evidence gathered in the field, the known character of the bed in adjoining counties, and a planimetric determination by A. M. Hagan of the area of the bed from Map II, as limited on Figure 10, the following estimate is made by the author of the amount of Chilton Coal available in Fayette County:

Probable Amount of Chilton Coal.

District.	Thickness of Coal Assumed, Feet.	Square Miles.	Acres.	Cubic Feet of Coal.	Short Tons of Coal.
Falls	1.5	31.67	20,268.8	1,324,363,392	52,974,536
Mountain Cove.....	1.5	0.99	633.6	41,399,424	1,655,977
Kanawha	2.5	20.60	13,184 0	1,435,737,600	57,429,504
Fayetteville	2.0	0.50	377.6	32,896,512	1,315,860
Totals for County........		53.85	34,464.0	2,834,396,928	113,375,877

THE CEDAR GROVE COAL.

The Cedar Grove Coal, described briefly in Chapter VI, pages 249-250, has been mined extensively on a commercial scale along the Kanawha River Valley, 4 to 6 miles westward from Fayette and it is believed to attain minable dimensions and purity over the greater portion of the minable area indicated for it on Figure 11. It has been prospected but little and never mined commercially in the territory of this report, so that the information concerning it is not so complete as that obtained for some of the other beds. However, the following average results, compiled by R. C. Tucker from 64 separate analyses published in previous State Survey Reports for mines mostly in Kanawha, Boone, Logan, and Mingo Counties, reveal a coal of remarkable purity and comparatively high calorific value, being slightly higher in percentage of sulphur and phosphorus than the average results published on preceding pages of this Chapter from several samples of the Winifrede and Chilton beds:

	Per cent.
Moisture	1.01
Volatile Matter	36.19
Fixed Carbon	57.36
Ash	5.44
Total	100.00
Sulphur	1.15
Phosphorus	0.011
Calorimeter B. T. U	14,279

Falls District.

In the Falls District region the thickness and stratigraphic position of the Cedar Grove Coal are exhibited in the special sections published in Chapter IV for Cedar Grove in Kanawha County and Albion in Nicholas, pages 118 and 139, respectively. **Coal Digging No. 280 on Map II** is represented in the latter section.

Kanawha District.

In Kanawha District, the thickness and stratigraphic position of the Cedar Grove Coal are exhibited in the sections

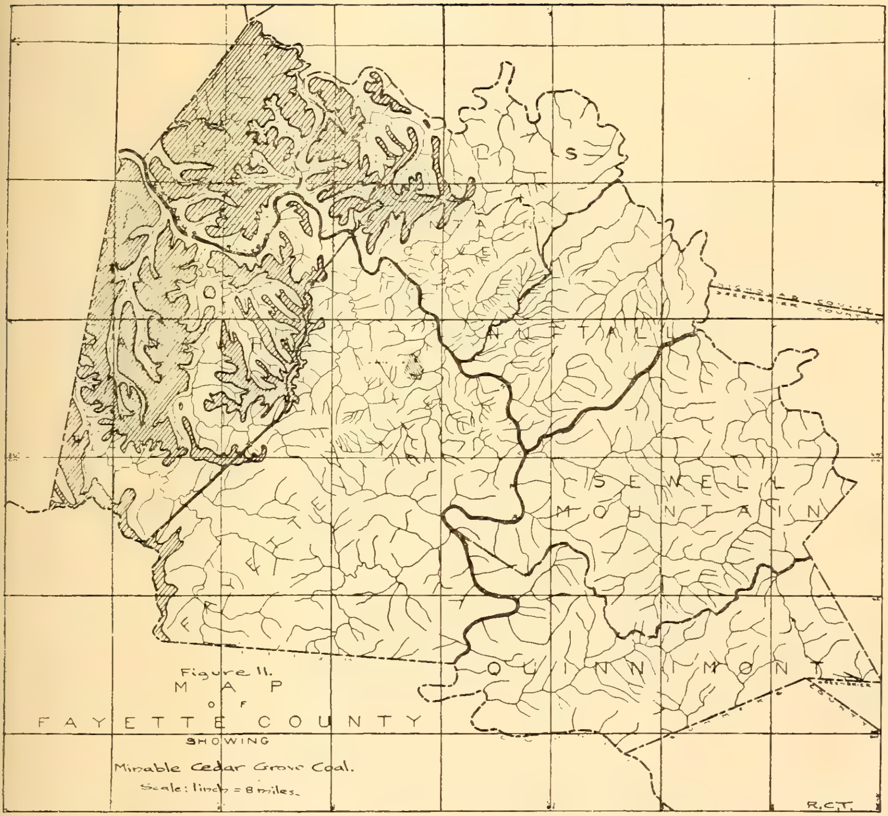


Figure 11.
MAP
OF
FAYETTE COUNTY
SHOWING
Minable Cedar Grove Coal.
Scale: 1 inch = 8 miles.

given in Chapter IV for Columbia– 1.2 Miles Southwest, Powellton—½ Mile Northwest, and Mt. Carbon, pages 155, 156, and 147, respectively. In this District it has been prospected slightly more than in that (Falls) just described. The three following exposures and diggings were examined by the author:

Coal Exposure—No. 281 on Map II.

On Morris Creek, 0.8 mile south of Donwood; **Cedar Grove Coal**; elevation, 915′ B.

				Feet.	Inches.
Shale, dark, argillaceous, with thin lenses of sandstone, visible				30	0
Coal, gas	0′	9″			
Shale, gray, argillaceous	0	3			
Coal, gas	0	5			
Slate, gray, ½″ to	0	1			
Coal, gas	0	3			
Slate, gray	0	0½	**Cedar**		
Coal, gas	0	3½	**Grove**	2	1
Shale				1	0
Sandstone and concealed				17	0
Coal, Alma (Opening No. 286 on Map II)				2	8

The 30 feet of shale, or member No. 1 above, carries local lenses of **Seth Limestone**, 10 feet above the top of the Cedar Grove Coal.

Coal Opening—No. 282 on Map II.

On Morris Creek, 1.1 miles south of Donwood; **Cedar Grove Coal**; elevation, 935′ B.

	Feet.	Inches.
Coal, 3′ 0″ to	4	0

Coal Prospect—No. 283 on Map II.

On branch of Falls Creek, 1.4 miles S. 10° E. of Kanawha Falls; **Cedar Grove Coal**; elevation; 1735′ B.

	Feet.	Inches.
Concealed		
Coal, gas, (slate floor)	1	6

Mountain Cove District.

In Mountain Cove District, only a single exposure of the Cedar Grove Coal bed was observed, this being in the hill road immediately west of Ansted. Here, its thickness and stratigraphic position are exhibited in the Ansted Section in Chapter IV, page 171.

Fayetteville District.

As shown on Figure 11, the Cedar Grove Coal is confined to a narrow belt along the western border of Fayetteville District, and to another similar area along the southwest edge on the east side of Paint Mountain, where it probably attains the best development in the County. The following data at a prospect on this bed were obtained by the author, the stratigraphic position of which is exhibited in the Potato Hill Knob Section, page 191:

Coal Prospect—No. 284 on Map II.

On northeast slope of Potato Hill Knob, 2½ miles northwest of Herberton; **Cedar Grove Coal**; elevation, 2605′ B; closed; section as reported by Wm. Bailey, miner.

			Feet.	Inches.
Sandstone, roof				
Coal, soft	0′	6″		
Bony **coal** or slate	0	1½		
Coal, medium-hard	3	8½	4	4
Slate				

Quantity of Cedar Grove Coal Available.

The lack of prospect openings and commercial mines on the Cedar Grove Coal in Fayette County makes it difficult to determine the available tonnage. Based on all the evidence gathered in the field; its known character in the immediately adjoining Counties of Nicholas, Kanawha, and Raleigh; and a planimetric determination by A. M. Hagan of the area of the bed from Map II, as limited on Figure 11, the following estimate of available tonnage is made by the author:

Probable Amount of Cedar Grove Coal.

District.	Thickness of Coal Assumed, Feet.	Square Miles	Acres.	Cubic Feet of Coal.	Short Tons of Coal.
Falls	2.0	43.05	27,552.0	2,400,330,240	96,013,209
Kanawha	2.5	35.17	22,508.8	2,451,208,320	98,048,333
Mountain Cove	2.0	1.98	1,267.2	110,398,464	4,415,939
Fayetteville	2.5	1.72	1,100.8	119,877,120	4,795,085
Totals for County'		81.92	52,428.8	5,081,814,144	203,272,566

THE ALMA COAL.

The Alma Coal, described briefly in Chapter VI, pages 251-2, has never been mined commercially in Fayette County nor in the Kanawha River Valley, but southwestward in Boone, Logan, and Mingo Counties it has long been so operated successfully. In the territory of this Report, it has been prospected considerably, and it is believed to attain minable dimensions and regularity over the greater portion of the area indicated for it on Figure 12. Its excellent character as a gas, steam, and domestic fuel coal is attested by the following average results, compiled by R. C. Tucker from 17 separate analyses published in previous State Survey Reports from samples in mines located mostly in Boone, Logan, and Mingo Counties. These show that it compares favorably with the results obtained for other higher coals of the Kanawha Group:

	Per cent.
Moisture	1.49
Volatile Matter	33.97
Fixed Carbon	58.24
Ash	6.30
Total	100.00
Sulphur	1.12
Phosphorus	0.008
Calorimeter B. T. U.	13,930

Falls District.

In Falls District, the Alma Coal is confined to that portion lying to the west of Horseshoe Creek. Its thickness and stratigraphic position are exhibited in the Cedar Grave Section, page 118; and in the logs of Coal Test Borings Nos. 4 and 6 on Map II, pages 392 and 394, respectively. While its thickness at the two bore holes in question is not so promising from a mining standpoint, yet its dimensions at exposures along the Kanawha River warrant the assumption on a subsequent page of a thickness of 18 inches in this District in forming an estimate of its available tonnage.

Kanawha District.

In Kanawha District, the thickness and stratigraphic position of the Alma Coal are exhibited in the sections published in Chapter IV for Crescent, Mt. Carbon, Columbia—1.2 Miles Southwest, Page, and Kingston. The eight following exposures and prospects were examined by the author:

Coal Exposure—No. 285 on Map II.

On east bank of Morris Creek, 0.9 mile south of Donwood; **Alma Coal**; elevation, 905′ B.

				Feet.	Inches.
Sandstone, visible				12	0
Shale, buff, sandy				3	0
Coal, slaty	0′	6″			
Coal, gas	2	4	**Alma**	2	10
Shale, flaggy, sandy				15	0
Limestone, Campbell Creek, lenticular, 0″ to				1	3
Shale, sandy, to railroad grade				10	0

Coal Exposure—No. 286 on Map II.

On west bank of Morris Creek, 0.9 mile south of Donwood; **Alma Coal**; elevation, 905′ B.

	Feet.	Inches.
Coal blossom, heavy, Cedar Grove	3	0
Shale	5	0
Sandstone, visible	10	0
Shale, buff	3	0

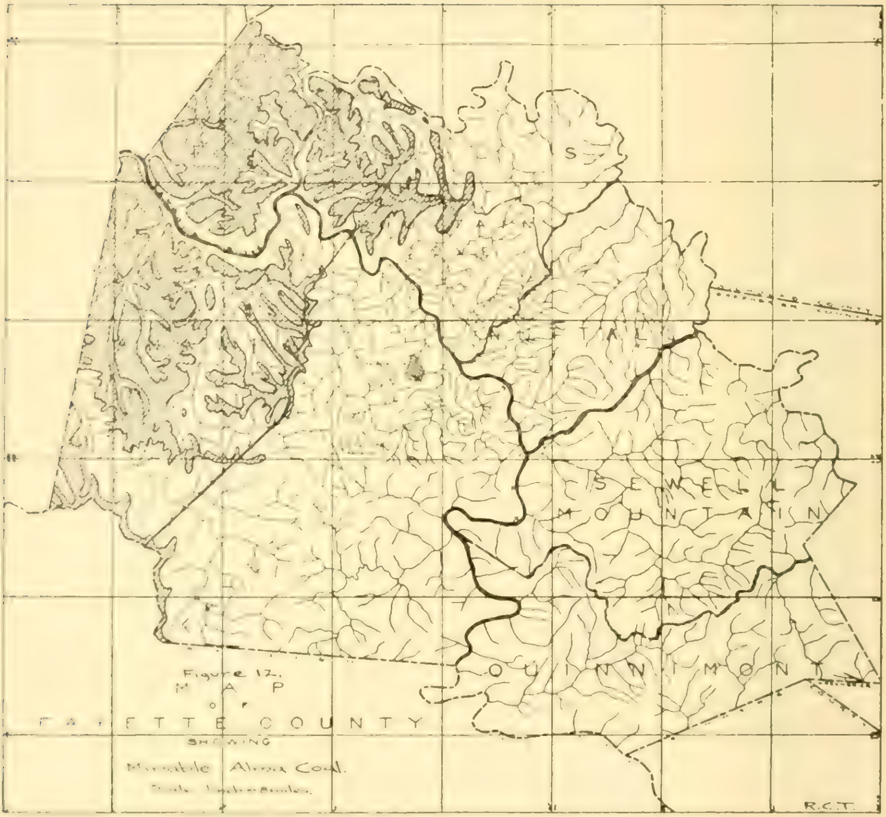


Figure 12.
MAP
OF
FAYETTE COUNTY
SHOWING
Workable Alma Coal.
Scale 1 inch = 8 miles.

				Feet.	Inches.
Coal, gas	0′	3½″			
Shale, dark-gray	0	6			
Coal, gas	1	6			
Bone, 0″ to	0	1½			
Coal	0	3	**Alma**	2	8
Shale				5	0

The **Alma Coal** is exposed on the southwest hillside of Kanawha River, 0.6 mile southeast of Eagle, at an elevation of 1037′ B., and has a thickness of 1′ 10″, as given on a subsequent page under **Mine No. 45 on Map II** in the No. 2 Gas Coal. This exposure shows the true position of the Alma Coal with respect to the Campbell Creek Limestone and the Peerless and No. 2 Gas Coal beds.

Coal Exposure—No. 287 on Map II.

On southwest hillside of Kanawha River, opposite Boomer; **Alma Coal**; elevation, 1035′ B.

				Feet.	Inches.
Sandstone, visible				15	0
Shale, buff, sandy, iron ore nodules, plant fossils				7	0
Coal, gas	1′	2″			
Shale, gray	0	1			
Coal, gas (slate floor)	0	5	...	1	8

Kilbourne & Jacobs Coal Prospect—No. 288 on Map II.

In ravine, on south hillside of Kanawha River, 2.5 miles southwest of Kanawha Falls; **Alma Coal**; elevation, 1460′ B.

	Feet.	Inches.
Shale, buff, sandy, with iron ore nodules, visible	8	0
Shale, gray, argillaceous	1	8
Coal gas, medium-hard, (shale, gray, pavement)	2	9

Kilbourne & Jacobs Coal Prospect—No. 289 on Map II.

On west side of point, south hillside of Kanawha River, 2 miles southwest of Kanawha Falls; **Alma Coal**; elevation, 1555′ B.

	Feet.	Inches.
Sandstone, roof, visible	5	0
Coal, gas, medium-hard, (shale, gray, floor)	2	4½

Kilbourne & Jacobs Coal Prospect—No. 290 on Map II.

In east hill side of Lee Branch, 1.5 miles due south of Kanawha Falls; **Alma Coal**; elevation, 1675′ B.

			Feet.	Inches.
Shale, buff and sandy, visible			6	0
Coal, gas	2′	10 ″		
Slate, black, ¼″ to	0	0½		
Coal, splinty, (sandstone, pavement)	2	8	5	6½

The base of the Alma Coal at the above prospect is 36 feet by hand-level above the base of the No. 2 Gas Coal at **Prospect No. 308 on Map II.**

Kilbourne & Jacobs Coal Prospect—No. 291 on Map II.

On branch of Falls Creek, 1.4 miles S. 10° E. of Kanawha Falls; **Alma Coal**; elevation, 1695′ B.

			Feet.	Inches.
Shale, sandy, visible			1	0
Coal, gas	1′	3 ″		
Slate, black, 0″ to	0	0⅛		
Coal, gas, hard (slate floor)	2	11	4	2⅛

Mountain Cove District.

In Mountain Cove District, the Alma Coal is confined to the northwestern corner as shown on Figure 12, high up on the wooded hillsides of Gauley Mountain and its intimately associated spurs. No exposures of the bed were observed in this region, but the dimensions obtaining for this coal only 3 to 4 miles southwestward at Prospects Nos. 288-291, inclusive, described above, warrant the assumption of a thickness of 18 inches in the table given on a subsequent page showing an estimate of the available tonnage of Alma Coal by magisterial districts.

Fayetteville District.

In Fayetteville District the thickness and stratigraphic position of the Alma Coal are exhibited in the sections published in Chapter IV for Potato Hill Knob and Herberton, pages 191 and 193, respectively. As shown on Figure 12, the coal is confined to a narrow belt in the western border of the District, and to another similar area in the southwest edge on the east side of Paint Mountain. In the latter region the interval between the base of the Alma and No. 2 Gas Coal beds has increased from 40 feet, prevailing at Montgomery, to 80 feet at Herberton, as against 110 and 120 feet in the Rawl and Sprigg regions of Mingo County, respectively. The two following openings on this bed in Fayetteville District were examined by the author:

R. E. Amick Coal Opening—No. 292 on Map II.

On southeast slope of Ford Knob, 5 miles due west of Fayetteville; **Alma Coal**; elevation, 2105′ B.

			Feet.	Inches.
Sandstone, current-bedded, visible			6	0
Coal, soft, columnar	0′	5″		
Slate, black	0	1		
Coal, soft, columnar	0	7		
Shale, gray, sandy, **coal** streak, 6″ to	0	8		
Coal, soft, columnar (slate floor)	1	1	2	10

Coal Prospect—No. 293 on Map II.

On head of Willis Branch, 1.5 miles due west of Herberton; **Alma Coal**; elevation, 2765′ B.

			Feet.	Inches.
Sandstone, visible			4	0
Coal, soft, columnar	0′	6″		
Shale, gray	0	6		
Coal, splinty	0	2		
Shale, gray	0	2		
Coal, soft, 2″ to	0	3		
Shale, gray	0	3		
Coal, soft	0	2		
Coal and slate, mixed	0	3		
Coal, soft, columnar	2	0		
Coal, soft, with thin slate streaks	2	0	6	3
Slate				

Quantity of Alma Coal Available.

Based on all the evidence gathered in the field and a planimetric determination of its area by A. M. Hagan from Map II as limited on Figure 12, the following estimate of the available tonnage is made by the author:

Probable Amount of Alma Coal.

District	Thickness of Coal Assumed. Feet.	Square Miles.	Acres.	Cubic Feet of Coal.	Short Tons of Coal.
Falls	1.5	46.10	29,504.0	1,927,791,360	77,111.654
Kanawha	2.5	39.68	25,395.2	2,765,537,280	110,621,491
Mountain Cove.......	1.5	2.43	1,555.3	101,616,768	4,064,671
Fayetteville	2.0	2.20	1,408.0	122,664,960	4,906,598
Totals for County..	....	90.41	57,862.4	4,917,610,368	196,704,414

THE CAMPBELL CREEK (PEERLESS AND NO. 2 GAS) COAL.

The Campbell Creek Coal, comprising both the Peerless and No. 2 Gas divisions, has been briefly described in Chapter IV, pages 253-254. Its detailed outcrop is shown on Map II and its minable area on Figure 13. In the territory of this Report it ranks second only to the Sewell bed in economic importance and available tonnage. The upper or Peerless division is usually separated from the lower or No. 2 Gas member by a dark-gray and argillaceous shale, carrying plant fossils and often marine fossil shells, the whole ranging from a few inches to 30 feet in thickness. Both divisions are frequently operated in the same mining section and both are worked separately at several commercial mines within the County, especially the No. 2 Gas bench. The excellent character of the Campbell Creek bed as a gas and coking coal and for steam and domestic fuel purposes is attested by the following average results from the State as a whole, compiled by R. C. Tucker from 65 separate analyses published in previous State Survey Reports mostly from widely scattered commercial mines in the southern part of West Virginia:

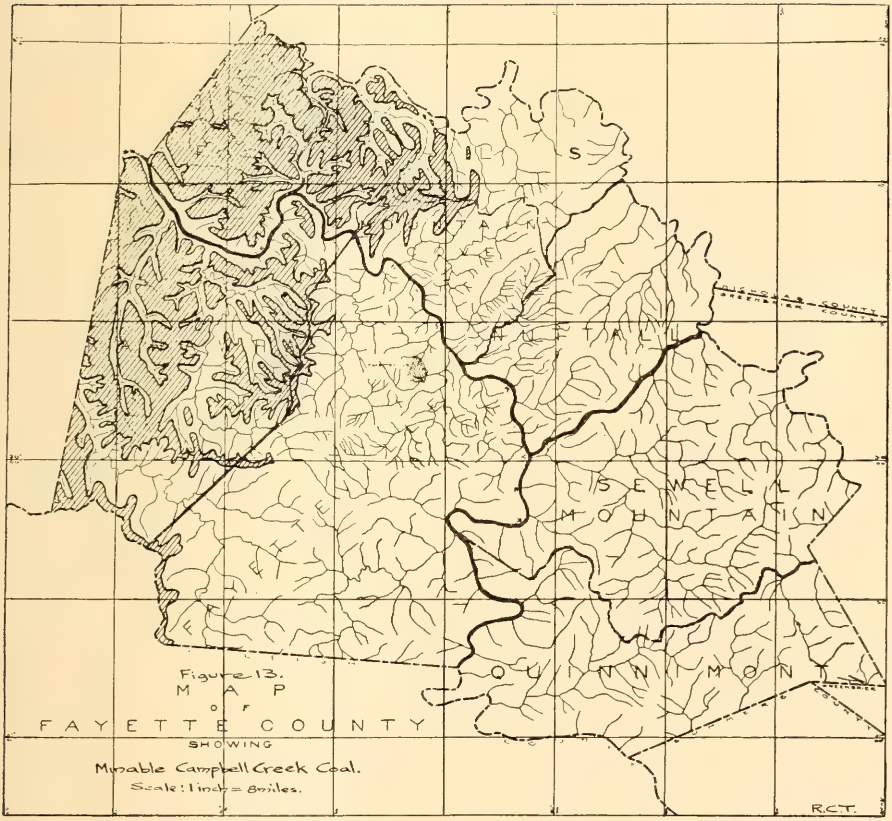


Figure 13.
MAP
of
FAYETTE COUNTY
SHOWING
Minable Campbell Creek Coal.
Scale: 1 inch = 8 miles.

	Per cent.
Moisture	0.88
Volatile Matter	32.71
Fixed Carbon	60.87
Ash	5.54
Total	100.00
Sulphur	1.17
Phosphorus	0.009
Calorimeter B. T. U	14,348

It has long been mined commercially in Fayette and it has also been prospected considerably by natives for local domestic fuel and by the large land-holding companies. Its thickness and character at these openings and at outcrop exposures will now be described by magisterial districts.

Falls District.

In Falls District, the Campbell Creek Coal, including both the Peerless and No. 2 Gas members, is confined to that portion lying west of Horseshoe Creek, the area of which is shown on Figure 13. The latter, as also Map II, shows that it lies mostly above the drainage of the larger streams and that it may be operated in almost every portion of the District by drift openings. Its thickness and stratigraphic position in Falls are exhibited in the sections published in Chapter IV for Marting, Smithers, Harewood, Boomer—¾ Mile East, Boomer, Deepwater—½ Mile North, Gauley Bridge, Vanetta, Gamoca, Wyndal, Albion, and Panther Mountain; in the log of Well No. 20 on Map II; and in the log of Coal Test Borings Nos. 1-6, 12 and 48 on Map II.

Its description at 35 to 40 commercial mines, prospect openings and other exposures now follows:

Kanawha & Hocking Coal & Coke Co. Mine No. 111—No. 17 on Map II.

⅓ mile southeast of Carbondale, on north bank of Blake Branch; **Campbell Creek (No. 2 Gas) Coal**; elevation, 795′ B.; examined by Teets.

				Feet.	Inches.
Shale, visible				8	0
Coal, (825′ B.), Alma				1	6
Slate and shale, gray				7	0
Coal, gas, Peerless, (815′ B.)				1	11
Slate, and gray shale, marine fossils abundant				16	0
Coal, splint	1′	7 ″			
Slate	0	0¾			
Coal, block, gas	3	10¼			
Slate and gray shale	1	2			
Coal	1	1	**No. 2 Gas**	7	9
Concealed				35	0
Coal				1	2

"Principal office, Longacre, W. Va.; shipped to Lakes or north; used for domestic and steam purposes; number of men employed, 60 miners and 40 day men; capacity, 1000 tons daily; output, 500 tons daily; 102 beehive coke ovens, not in operation at present; Lee Jenkins, Mine Foreman, authority for data."

The above mine was formerly owned by the Sunday Creek Coal Company and also by the Sunday Creek Company. Samples of the gas and splint coals were taken by Messrs. R. W. Edmonds and A. P. Brady and analyzed by Prof. Hite. The results were published under Nos. 5 and 6 in the table of coal analyses on page 572 of Volume II, and republished by Dr. White under the same numbers on pages 364-5 of Volume II(A) and page 263 of Bulletin *2* of the Survey. They are republished under **Mine No. 17** in Table 1 of coal analyses at the end of this Chapter. A sample of the coke made from the coal at the above mine, collected by Messrs. Edmonds and Brady, was analyzed by Prof. Hite and the results published under No. 3 in the table of coke analyses on page 574 of Volume II and republished by Dr. White under the same number on page 366 of Volume II(A) and on page 264 of Bulletin 2, of the Survey. This analysis is republished under **Mine No. 17** in Table 2 at the end of this Chapter.

Kanawha & Hocking Coal & Coke Co. Mine No. 112—No. 18 on Map II.

¾ mile southeast of Carbondale, on north bank of Blake Branch; **Campbell Creek (No. 2 Gas) Coal**; elevation, 840′ B.; examined by Teets.

				Feet.	Inches.
Slate, marine fossils abundant					
Coal, gray splint	1′	6″			
Coal, gas	0	7			
Coal	1	11			
Coal, gas (slate floor)	1	1	**No. 2 Gas**	5	1

"Coal shipped west for domestic and steam purposes; number of men employed, 33 miners, 50 laborers; capacity, 1000 tons; output, 300 tons; 200 beehive coke ovens, 70 to be used soon; expect to make 100 tons of coke per day with 70 ovens; A. J. Jenkins, Mine Foreman, authority for data."

The above mine was formerly owned by the Sunday Creek Coal & Coke Company.

Cannelton Coal & Coke Co. Mine No. 1—No. 19 on Map II.

On west bank of Smithers Creek, 0.7 mile north of Carbondale; **Campbell Creek (No. 2 Gas) Coal**; elevation, 730′ B.; section measured at mouth of first dip face by Teets.

				Feet.	Inches.
Slate, marine fossils abundant					
Coal, gas	0′	5 ″			
Coal, splint	0	10			
Coal, gas	0	2			
Slate, gray	0	0½			
Coal, gas	3	6			
Slate, gray, 1″ to 4″	0	2½			
Coal, gas (slate floor)	1	1	...	6	3

"Principal office, Cannelton; shipped to lakes; used for domestic and steam purposes and by-product ovens; number of men employed, 175 miners and 125 day men; capacity, 1900 tons daily; output, 1900 tons daily; Thomas Cunningham, Mine Foreman, authority for data."

The above mine was formerly owned by the Cannelton Coal Company. The coal from the above mine was sampled by R. W. Edmonds and A. P. Brady and analyzed by Prof. Hite and the results published under Nos. 7 and 8 in the table of coal analyses on page 572 of Volume II of the Survey, for the splint and gas coals, respectively, and republished by Dr.

White under the same numbers on pages 364-5 of Volume II(A) and page 263 of Bulletin 2, of the Survey, and these analyses are given under **Mine No. 19** in Table 1 at the end of this Chapter. A sample of the coke from the above mine was also collected by Messrs. Edmonds and Brady and analyzed by Prof. Hite, the results being published under No. 2 in the table of coke analyses on page 574 of Volume II of the Survey and republished by Dr. White under the same number on page 366 of Volume II(A) and page 264 of Bulletin 2, and the analysis is given under **No. 19** in Table 2 at the end of this Chapter.

The following section of the coal was measured by Teets at the Fan-House Opening of No. 1 Mine, opposite mouth of Twomile Creek, at an elevation of 755′ B.:

				Feet.	Inches.
Slate, marine fossils abundant					
Coal, gas	0′	5″			
Coal, splint	0	9			
Coal, gas	0	3			
Slate	0	0½			
Coal, gas	3	5½			
Slate	0	2			
Coal, gas (slate floor)	0	10	...	5	11

Cannelton Coal & Coke Co. No. 2 Mine—No. 20 on Map II.

On north bank of Smithers Creek, ⅛ mile east, of Buffalo Fork; **Campbell Creek (No. 2 Gas) Coal**; elevation, 721′ L.; examined by Teets.

				Feet.	Inches.
Slate, marine fossils abundant					
Coal, gas	0′	6″			
Coal, splint	0	8			
Coal, gas	0	3			
Slate, gray	0	0½			
Coal, gas, block	3	5½			
Slate	0	3			
Coal,, gas (slate floor)	1	0	...	6	2

Samples of the gas and splint coals from the above mine were collected by R. W. Edmonds and A. P. Brady and analyzed by Prof. Hite, and published by I. C. White under Nos. 9 and 10, respectively, on page 572 of Volume II, and republished by him under the same numbers on page 365 of

Volume II(A) and page 263 of Bulletin 2 of the Survey. The results of these two tests are republished under **Mine No. 20** in Table 1 at the end of this Chapter.

Cannelton Coal & Coke Co. No. 4 Mine—No. 21 on Map II.

On south bank of Smithers Creek, 0.2 mile east of Twomile Creek; **Campbell Creek (No. 2 Gas) Coal**; elevation, 880′ B.; examined by Teets.

			Feet.	Inches.
Slate, marine fossils				
Coal, gas	0′	5″		
Coal, splint	0	11		
Coal, gas	0	3		
Slate	0	0½		
Coal	3	4½		
Slate, sandy, 1″ to 5″	0	3		
Coal, gas (slate floor)	1	0	6	3

Cannelton Coal & Coke Co. No. 5 Mine—No. 22 on Map II.

On north bank of Smithers Creek, 0.4 mile west of Marting; **Campbell Creek (No. 2 Gas) Coal**; elevation, 880′ B.; examined by Teets.

			Feet.	Inches.
Slate, marine fossils abundant				
Coal, semi-cannel	0′	3″		
Coal, splint	1	6		
Coal, gas	0	5		
Coal, semi-splint	2	1		
Coal, gas	1	0	5	3

The above section was measured 200 feet under cover.

Columbus Iron & Steel Co. No. 1 Mine—No. 23 on Map II.

On east hillside of Smithers Creek, at Marting; **Campbell Creek (No. 2 Gas) Coal**; elevation, 950′ B.; section in 10 and 11 Right off 2nd Face Heading, North; examined by Teets.

			Feet.	Inches.
Coal, splint (slate floor)	2′	1″		
Slate	0	6½		
Coal, gas	1	3¼		
Stone	0	10¾		
Coal, gas (slate floor)	1	10½	6	8

The following section was measured by Teets in 5th and 6th Left, 2nd Face, South, Heading:

				Feet.	Inches.
Coal, splint (slate roof)	2′	4⅗″			
Slate, black	2	2⅗			
Coal, gas (slate floor)	2	5⅕		6	0⅖

The following section of the coal at the above mine was also measured by Teets:

			Feet.	Inches.
Coal, splint (slate roof)	2′	6″		
Coal, gas (slate floor)	3	0	5	6

The coal from this mine was once sampled by Messrs. R. W. Edmonds and A. P. Brady and analyzed by Prof. Hite, the results being published under No. 18 in the table of coal analyses on page 572 of Volume II of the Survey, and republished by Dr. White under the same number on pages 365-6 of Volume II(A) and page 263 of Bulletin 2. The analysis is given under **No. 23** in Table 1 at the end of this Chapter.

The following interesting section at the mouth of Fourmile Fork was measured by the writer in 1907 and published by Dr. White on pages 373-4 of Volume II(A):

					Feet.	Inches.
1.	**Kanawha Black Flint**				4	0
2.	Concealed and massive sandstone				560	0
3.	Sandstone, visible				40	0
4.	**Coal**, soft	0′	9″	**Peerless**	7	6
5.	Fire clay shale	6	0			
6.	**Coal**, soft	0	9			
7.	Sandy shales and black slate				15	0
8.	**Coal**, splint	1′	6″	**No. 2 Gas**	5	5
9.	Gray splint, hard	0	2			
10.	**Coal**, soft	0	4			
11.	Slate, black, hard, 1½″ to	0	2			
12.	**Coal**, splint, gray	0	4			
13.	**Coal**, splint	0	10			
14.	Slaty fire clay, 1″ to	0	0½			
15.	**Coal**, soft	2	0½			
16.	Slate, black					

"Butts, N. 75½° E.; faces, S. 14½° E.; greatest rise, S. 45° E.; mine capacity, 1000 tons; men employed, 150; about one-third of the output is coked and the product shipped to Columbus, Ohio, for furnace use, the balance of the screened coal being shipped west by rail for steam and domestic purposes; sample from Nos. 8, 9, 10, 12, 13 and 15, for analysis of which see Table No. 5, page 393, of Volume II(A), under No. 13; authority for mine data, John Phillips, Superintendent."

The analysis of this sample is republished under **Mine No. 23** in Table 1 at the end of this Chapter.

A sample of the 48-hour coke made here from the No. 2 Gas Coal was also collected by the writer, and the results of the analysis, as published on page 374 of Volume II(A), are given under **Mine No. 23** in Table 2 at the end of this Chapter.

The bed was also measured and sampled at 6 points in the above mine by D. J. Parker and H. D. Jones, of the U. S. Bureau of Mines, on January 28, 1916, as given on page 401 of Bulletin 123 of the latter, the analyses being published on page 117.

Section A (sample 24055) was measured at face of 21 room, 3 left heading, 4,400 feet S. 70° E. from pit mouth; thickness of bed, 6′ 11″; thickness of coal sampled, 5′ 6½″.

Section B (sample 24056) was measured at face of 21 room, 4 left heading, 4,700 feet S. 65° E. from pit mouth; thickness of bed, 6′ 4″; thickness of coal sampled, 5′ 2″.

Section C (sample 24057) was measured at face of 10 room, 5 left heading, 4,000 feet S. 55° E. from pit mouth; thickness of bed, 5′ 9″; thickness of coal sampled, 4′ 8″.

Section D (sample 24058) was measured at face of 11 room, 6 left heading, 4,200 feet S. 50° E. from pit mouth; thickness of bed, 6′ 2″, thickness of coal sampled, 4′ 10″.

Section E (sample 24059) was measured at face of 5 room, 1 left heading, 3,200 feet N. 80° E. from pit mouth; thickness of bed, 5′ 1″; thickness of coal sampled, 4′ 9″.

Section F (sample 24060) was measured at face of 15 room, 2 left heading, 4,100 feet S. 75° E. from pit mouth; thickness of bed, 5′ 8½″; thickness of coal sampled, 5′ 0″.

The ultimate analysis of a composite sample made by combining face samples 24055 to 24060 is given under laboratory No. 24061.

These seven analyses are published under **Mine No. 23** in Table 3 at the end of this Chapter.

"Notes.—Thickness, 5 to 7 feet. Roof, 'draw slate'; floor, hard shale. Cover at points of sampling, 1,000 to 1,100 feet. Room-and-pillar system of mining. In 1916 the coal was undercut with machines and shot down with black blasting powder. The output was 950 tons a day."

W. R. Johnson Coal Co. Mine—No. 24 on Map II.

On northwest hillside of Kanawha River, 0.4 mile southeast of Smithers; **Campbell Creek (No. 2 Gas) Coal**; elevation, 915′ B.; section in main heading about 500 feet under; examined by Teets.

			Feet.	Inches.
Coal, gas, (slate roof)	0′	6 ″		
Coal, splint	1	1		
Slate, gray	0	0½		
Coal, gas	3	11½	5	7
Slate, gray				
Coal, visible, 1′ 6″, (not mined), reported			2	0
Slate, reported				

(See mine No. 69 on Map II in Eagle Coal for mine data).

The coal from the above mine was once sampled by Messrs. R. W. Edmonds and A. P. Brady and the analysis of same published by Dr. White under No. 17 on page 572 of Volume II of the Survey, and also republished under the same number in the table of coal analyses on page 366 of Volume II(A) and page 263 of Bulletin 2 of the Survey. The analysis is given under **Mine No. 24** in Table 1 at the end of this Chapter.

Kanawha & Hocking Coal & Coke Co. Longacre No. 114 Mine—No. 25 on Map II.

On east hillside of Kanawha River, at Longacre; **Campbell Creek (No. 2 Gas) Coal**; elevation, 910′ B.; examined by Teets.

				Feet.	Inches.
Concealed				40	0
Coal, Alma				0	10
Shale, sandstone, and slate				7	0
Sandstone				3	0
Coal, gas, Peerless				0	9
Slate, dark, marine fossils in abundance				12	0
Coal, gas	0′	2″			
Coal, splint	1	0			
Slate	0	1			
Coal, (slate floor)	3	3	**No. 2 Gas.**	4	6

Samples of the splint and gas coal from the above mine were collected by R. W. Edmonds and A. P. Brady and analyzed by Prof. Hite and the results published by I. C. White under Nos. 3 and 4 on page 572 of Volume II, and republished by him under the same numbers on page 365 of Volume

II(A) and page 263 of Bulletin 2 of the Survey. These analyses are republished under **No. 25** in Table 1 at the end of this Chapter.

A sample of the coke made from the "gas" division of this coal was also collected by Messrs. Edmonds and Brady and analyzed by Prof. Hite and the results published by Dr. White under No. 6 in the table of coke analyses on page 574 of Volume II of the Survey and republished by him under the same number of page 366 of Volume II(A) and also on pages 263-4 of Bulletin 2. This analysis is republished under **No. 25** in Table 2.

This mine was formerly operated by the Sunday Creek Coal Company.

The coal bed was also measured and sampled at six points in the above mine by D. J. Parker and H. D. Jones, of the U. S. Bureau of Mines, on January 20, 1916, as given on pages 400-401 of Bulletin 123 of the latter Bureau, the analyses being published on page 117 of the Bulletin in question.

Section A (sample 23986) was measured at face of 6 room, 10 east entry, 13 south heading, 11,700 feet N. 85° E. from pit mouth; thickness of bed and of coal sampled, 5′ 0″.

Section B (sample 23987) was measured at face of 1 room, 6 east entry, 13 south heading, 11,450 feet N. 76° E. from pit mouth; thickness of bed and of coal sampled, 4′ 10½″.

Section C (sample 23988) was measured at face of main east heading, 11,650 feet N. 75° E. from pit mouth; thickness of bed and of coal sampled, 4′ 6″.

Section D (sample 23989) was measured at face of 3 room, 3 east entry, 13 north heading, 11,600 feet east from pit mouth; thickness of bed and of coal sampled, 5′ 1″.

Section E (sample 23990) was measured at face of 1 room, 8 east entry, 13 south heading, 11,500 feet N. 80° E. from pit mouth; thickness of bed and of coal sampled, 4′ 10″.

Section F (sample 23991) was measured at face of 13 north heading, 11,650 feet N. 73° E. from pit mouth; thickness of bed, 4′ 10″; thickness of coal sampled, 4′ 9½″.

The ultimate analysis of a composite sample made by combining face samples 23986 to 23991 is given under laboratory **No. 23992**.

These seven analyses are published in Table 3 under **Mine No. 25** at the end of this Chapter.

"Notes.—Thickness, 4½ to 5 feet. Roof and floor, shale. Cover at points of sampling, 1,000 to 1,150 feet. In 1916 the coal was undercut with machines and shot down with black blasting powder. The daily output was about 1,200 tons."

Kanawha & Hocking Coal & Coke Co. Harewood Mine No. 115 (Abandoned)—No. 25A on Map II.

On east hillside of Kanawha River, ½ mile southeast of Longacre; **Campbell Creek (No. 2 Gas) Coal**; elevation, 980′ B.; examined by Teets.

	Feet.	Inches.
Coal (concealed roof and floor)	5	0

The splint and gas coals from the above mine were once sampled by R. W. Edmonds and A. P. Brady and analyzed by Prof. Hite and the results published by Dr. White under Nos. 1 and 2 on page 572 of Volume II and republished by him under the same numbers on pages 364-5 of Volume II(A) and page 263 of Bulletin 2 of the Survey. These analyses are republished under **No. 25A** in Table 1 at the end of this Chapter.

A sample of the coke from the "gas" division of the coal was also collected by Messrs. Edmonds and Brady and analyzed by Prof. Hite and the results published by Dr. White under No. 4 on page 574 of Volume II and under the same number on page 366 of Volume II(A) and on pages 263-4 of Bulletin 2. This analysis is republished under **No. 25A** in Table 2 at the end of this Chapter.

Boomer Coal & Coke Co. No. 5 Mine—No. 26 on Map II.

On northwest hillside of Boomer Branch, ½ mile northeast of Boomer; **Campbell Creek (No. 2 Gas) Coal**; elevation, 1037′ L.; examined by Teets.

			Feet.	Inches.
Coal, gas (slate roof)	0′	7″		
Coal, gray splint	1	1		
Slate	0	1		
Coal, splint	0	10		
Slate and impure **coal**	0	2		
Coal, gray splint	1	10		
Coal, gas (slate floor)	0	10	5	5

Boomer Coal & Coke Co. No. 1 Mine—No. 27 on Map II.

On southeast hillside of Boomer Branch, ½ mile east of Boomer; **Campbell Creek (No. 2 Gas) Coal**; elevation, 1045′ B.; examined by Teets.

			Feet.	Inches.
Coal, gas, (slate roof)	0′	6″		
Coal, gray splint	1	0		
Slate	0	1		
Coal, splint	0	11		
Slate and impure **coal**	0	2		
Coal, gray splint	1	8		
Coal, mother	0	1		
Coal, gas (slate floor)	1	0	5	5

The above mine was not in operation at the time of Teets' visit in August, 1916.

The coal from the above mine was once sampled by R. W. Edmonds and A. P. Brady and analyzed by Prof. Hite and the results published by Dr. White under No. 16 on pages 572-3 of Volume II of the Survey and republished by him under the same number on pages 365-6 of Volume II(A) and page 263 of Bulletin 2. This analysis is republished in the present Report under **No. 27** in Table 1 at the end of this Chapter.

Boomer Coal & Coke Co. No. 4 Mine—No. 28 on Map II.

On north side of Boomer Branch, 1.6 miles northeast of Boomer; **Campbell Creek (No. 2 Gas) Coal**; elevation, 1116′ L.; section in 1st South off Main Heading; examined by Teets.

			Feet.	Inches.
Coal, gas (slate roof)	0′	8″		
Coal, gray splint	1	2		
Slate	0	1		
Coal, splint	0	9		
Coal, slaty, impure	0	2		
Coal, gray splint	2	0		
Coal, mother	0	1		
Coal, gas, soft, (slate floor)	1	0	5	11

Teets also measured another section in the same mine 2000 feet east of the above in Main East Heading, as follows:

			Feet.	Inches.
Coal, gas (slate roof)	0′	7″		
Coal, gray splint	0	8		
Coal, mother	0	1		
Coal, gray splint	1	6		
Slate, sometimes sandstone	2	0		
Sulphur	0	3		
Coal, gray splint	1	11		
Coal, mother	0	1		
Coal, gas (slate floor)	1	0	8	1

Boomer Coal & Coke Co. No. 3 Mine—No. 28A on Map II.

On south side of Boomer Branch, 1.5 miles northeast of Boomer; **Campbell Creek (No. 2 Gas) Coal**; elevation, 1120′ B.; section at drift mouth; examined by Teets.

			Feet.	Inches.
Coal, gas, (slate roof)	0′	7″		
Coal, gray splint	1	1		
Slate	0	1		
Coal, splint	0	10		
Slate	0	1		
Coal, gray splint	2	0		
Coal, mother	0	1		
Coal	1	10	5	7

The author also measured a section of the coal at the above mine in 1907 and the results were published by Dr. White on pages 374-5 of Volume II(A) of the Survey, as follows:

				Feet.	Inches.
1.	Slate, good roof				
2.	**Coal**, gas	0′	7″		
3.	**Coal**, splinty	1	3		
4.	**Coal**, gas, soft	0	2		
5.	Slate, black, hard, 2″ to	0	1		
6.	**Coal**, splinty	0	10		
7.	**Coal**, gas, soft	3	3	6	2
8.	Slate, sandstone, and concealed			160	0
9.	**Coal, Eagle**, with partings			5	0

"'Butts, N. 45° E.; faces, S. 45° E.; greatest rise, S. 45° E.; mine capacity, 1000 tons; men employed, 120; much of the coal shipped to South Chicago and manufactured into coke in by-product ovens, also to Lakes for domestic and general fuel uses; authority for mine data, J. W. Elswick, Mine Foreman; sample from Nos. 2, 3, 4, 6, and 7, the analysis of which was published in Table No. 5 on page 393 of Volume II(A) under No. 14, and republished under the same number on page 265 of Bulletin 2."

The above-mentioned analysis is republished under **No. 28A** in Table 1 at the end of this Chapter.

Boomer Coal & Coke Co. Coal Opening—No. 294 on Map II.

On head of Boomer Branch, 2.4 miles N. 80° E. of Boomer; **Campbell Creek (No. 2 Gas) Coal**; elevation, 1190' B.; examined by Teets.

			Feet.	Inches.
Coal, gas (slate roof)	0'	8"		
Coal, gray splint	1	0		
Slate, black	0	1		
Coal, splint	0	11		
Slate	0	6		
Coal, gray splint	1	8		
Coal, mother	0	1		
Coal, gas (slate floor)	1	0	5	11

Coal Opening (Abandoned)—No. 28B on Map II.

On north hillside of Kanawha River, 1 mile northwest of Deepwater Station; **Campbell Creek (No. 2 Gas) Coal**; elevation, 1200' B.; examined by Teets.

	Feet.	Inches.
Coal	5	0

The stratigraphic position of the coal at the above mine is exhibited in the Deepwater—½ Mile North Section, page 127.

Sunday Creek Coal Co. Glen Ferris Mine (No. 117) (Abandoned)—No. 29 on Map II.

On west hillside of Kanawha River, ½ mile northwest of Glen Ferris; **Campbell Creek (No. 2 Gas) Coal**; elevation, 1270' B.; examined by Teets.

			Feet.	Inches.
Shale, bluish-gray, argillaceous, plant fossils abundant, visible			6	0
Coal, gas, medium-hard	2'	11"		
Shale, gray, ½" to	0	1		
Coal, gas, medium-hard (slate floor)	1	2	4	2

The above mine was abandoned in 1907.

A sample of the coal from this opening was once collected by R. W. Edmonds and A. P. Brady and analyzed by Prof. Hite and the results published by Dr. White under No. 12 on pages 572-3 of Volume II, and republished by him under the same number on page 365 of Volume II(A) and page 263 of Bulletin 2 of the Survey. This analysis is republished under **No. 29** in Table 1 at the end of this Chapter.

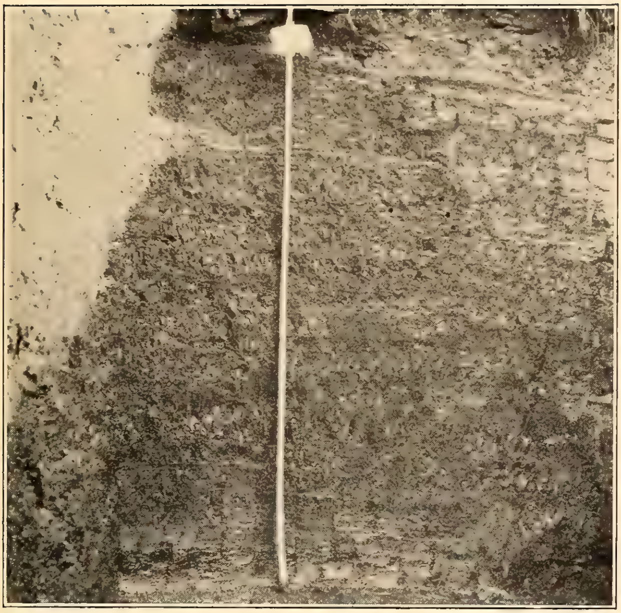


Photo by C. E. Krebs.

PLATE XVII(a).—View showing 4½ feet of No. 2 Gas Coal at opening on east side, Paint Creek, 1 mile north of Milburn.

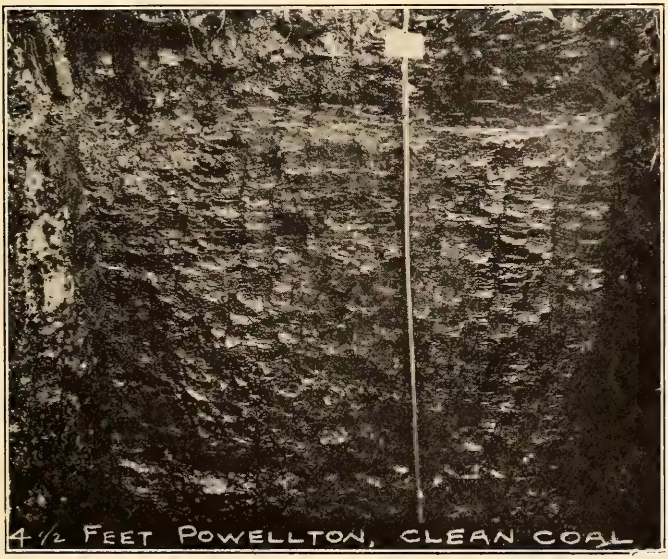


Photo by C. E. Krebs.

PLATE XVII(b).—View showing 4½ feet of Powellton Coal at opening near that above.

Major Hill Estate Coal Opening—No. 295 on Map II.

On west hillside of Gauley River, 0.6 mile north of Gauley Bridge; **Campbell Creek (No. 2 Gas) Coal**; elevation, 1215′ B.; examined by Teets.

		Feet.	Inches.
Coal, block, gas, (slate roof)	1′ 2″		
Coal, glossy, gas	1 10		
Coal, splinty	0 5	3	5

Boomer Coal & Coke Co. Coal Opening—No. 296 on Map II.

On head of Left Fork of Scrabble Creek; **Campbell Creek (No. 2 Gas) Coal**; elevation, 1130′ B.; examined by Teets.

	Feet.	Inches.
Slaty shale, gray, visible	5	0
Coal, gas, block (slate floor)	3	11

John Smith Coal Opening—No. 297 on Map II.

On south bank of Bells Creek, 2.2 miles N. 75° W. of Gauley Bridge; **Campbell Creek (Peerless) Coal**; elevation, 785′ B.; examined by D. B. Reger.

		Feet.	Inches.
Sandstone, massive		15	0
Shale, sandy		1	0
Coal		0	1
Shale, gray		0	5
Sandstone		2	0
Coal, medium-soft	1′ 10″		
Slate, gray	0 1		
Coal, (shale, gray, pavement)	0 9 **Peerless**.	2	8

Lynchburg Colliery Co. Mine—No. 30 on Map II.

On east hillside of Gauley River, 0.7 mile northeast of Gauley Bridge; **Campbell Creek (No. 2 Gas) Coal**; elevation, 1320′ B.; examined by Teets.

		Feet.	Inches.
Sandstone, fine-grained, visible		7	0
Shale, gray, plant fossils		2	0
Coal, block	1′ 2″		
Coal, gas, glossy	1 10		
Coal, gray splint (slate floor)	0 4	3	4

See Vanetta Section for stratigraphic position of coal.

The author also measured a section of the coal bed at the above mine in 1907 as published by Dr. White on page 376 of Volume II(A), as follows:

			Feet.	Inches.
1. **Coal, (Peerless)** gas, exposed at crop........			2	6
2. Shales, bluish..............................			15	0
3. **Coal**, gas................	2′	7″		
4. **Coal**, splint..............	1	1		
5. **Coal**, gas.................	0	4	**No. 2 Gas** 4	0

"Butts, N. 80° E.; faces, S. 10° E.; greatest rise, S. 50° E.; mine capacity, 400 tons; men employed, 75; coal shipped mostly east for steam and general fuel purposes; authority for mine data, J. C. Grisinger, Mine Foreman; sample from the three divisions of No. 2 Gas Coal, the analysis of which was published under No. 16 in Table No. 5, page 393, of Volume II(A)."

This analysis was also republished by Dr. White under the same number on page 265 of Bulletin 2, and it is given under **No. 30** in Table 1 at the end of this Chapter.

Lynchburg Colliery Co. Mine—No. 31 on Map II.

On head of branch of Sand Branch, 1.5 miles due east of Vanetta; **Campbell Creek (No. 2 Gas) Coal**; elevation, 1410′ B.; examined by Teets.

			Feet.	Inches.
Coal, block (slate roof)............	1′	3″		
Coal, glossy, gas...................	1	10		
Coal, splinty (slate floor)...........	0	4	3	5

"Principal office, Vanetta, W. Va.; shipped east for domestic and steam uses; electric haulage; number of men employed, 40 laborers and 55 miners; daily capacity, 800 tons; daily output, 300 tons; T. A. Deitz, Superintendent, authority for data."

Midvale Colliery Co. Mine—No. 32 on Map II.

On east hillside of Gauley River, 0.4 mile southeast of Gamoca; **Campbell Creek (No. 2 Gas) Coal**; elevation, 1225′ B.; examined by Teets.

			Feet.	Inches.
1. Sandstone, massive.........................				
2. Slate, full of fossil plants, 0″ to..............			3	0
3. **Coal**, gas, soft..................	2′	3″		
4. Slate, soft, 0″ to................	0	1		
5. **Coal**, gas.......................	0	4		
6. **Coal**, splint.....................	0	3		
7. **Coal**, gas, (slate floor)..........	0	8	3	7

"Butts, N. 80° E.; faces, S. 10° E.; greatest rise, S. 50° E.; mine capacity, 100 tons; men employed, 80; coal shipped mostly east for steam and general fuel purposes; authority for mine data, M. G. Campbell and J. M. Campbell, Superintendents; sample from Nos. 3, 5, 6 and 7, the analysis of which was published under No. 17 in Table No. 5, page 393, of Volume II(A) by Dr. White."

The above information and section are given as collected by the author in 1907, when the mine was operated by the Gamoca Coal Company. Teets reports, in addition to the above: "electrical haulage; number of men, 40 laborers and 53 miners; daily capacity, 1000 tons; daily output, 500 tons; T. A. Deitz, Superintendent, authority."

The analysis mentioned above was also republished by Dr. White under No. 17 on page 265 of Bulletin 2 of the Survey, and it is given under **No. 32** in Table 1 at the end of this Chapter.

Deitz Colliery Co. Mine—No. 33 on Map II.

On east hillside of Gauley River, ½ mile southeast of Wyndal; **Campbell Creek (No. 2 Gas) Coal**; elevation, 1110′ B.; examined by Teets.

			Feet.	Inches.
Sandstone, massive, visible			20	0
Coal, gas	2′	3″		
Slate, gray	0	3		
Coal	0	5		
Slate	0	1		
Coal	0	4		
Slate	0	1		
Coal (slate floor)	0	6	3	11

The author also measured a section of the coal at the above mine in 1907 and sampled the coal for analysis, the results being published by Dr. White on pages 377 and 393 of Volume II(A). The section measured is as follows:

				Feet.	Inches.
1.	Sandstone, massive, visible			25	0
2.	Slate, 0″ to			2	0
3.	**Coal**, gas, top 6″ semi-splint	2′	7 ″		
4.	Slate, gray, 1″ to	0	3½		
5.	**Coal**, gas	0	6		
6.	**Coal**, splint	0	6		
7.	**Coal**, gas	0	4	4	2½
8.	Slate, hard				

"Butts, N. 80° E.; faces, S. 10° E.; greatest rise, S. 50° E.; mine capacity, 400 tons; men employed, 100; coal shipped east and west for steam and general fuel purposes; authority for mine data, T. A. Deitz, Superintendent; sample from Nos. 3, 5, 6, and 7, the analysis of which was published under No. 18 in Table No. 5, page 393 of Volume II(A) and republished under the same number on page 265 of Bulletin 2 of the Survey. The gray slate, No. 4, sometimes disappears entirely."

The analysis mentioned above is republished under **No. 33** in Table 1 at the end of this Chapter.

Gauley Mountain Coal Co. Buck Run (No. 1) Mine—No. 34 on Map II.

On south hillside of Gauley River, 1.6 miles east of Belva; **Campbell Creek (Peerless) Coal**; elevation, 1075′ B.; section measured by Reger in pillar between Headings Nos. 4 and 5 of No. 2 Drift.

					Feet.	Inches.
1.	Sandstone					
2.	Draw slate				0	1
3.	Coal, soft	2′	7″			
4.	Slate, gray	0	6			
5.	Coal, slaty	0	3			
6.	Coal, soft, (slate pavement)	0	9	Peerless.	4	1

The above section was measured by D. B. Reger of the Survey Staff, who also collected a sample (No. 339R), from Nos. 3 and 6 for analysis, the composition of which is published under **No. 34** in Table 1 at the end of this Chapter.

Teets also measured a section of the coal near the mouth of the above mine, as follows:

				Feet.	Inches.
Coal, gas (sandstone roof)	2′	6″			
Shale, gray, slaty	0	6			
Coal, gas	0	3			
Coal, splint (slate floor)	0	7	Peerless.	3	10

"Principal office, Ansted, W. Va.; coal owned by operating company; daily capacity, 500 tons; daily output, 400 tons; number of men employed, 40 miners and 35 laborers; electric haulage; shipped east for steam and domestic purposes; C. G. Williams, Mine Foreman, authority for data."

Gauley Mountain Coal Co. (No. 1—Buck Run) Mine—No. 35 on Map II.

In head of branch, 0.6 mile south of No. 34; **Capbell Creek (No. 2 Gas) Coal**; elevation, 1095′ B.; examined by Teets and Reger.

			Feet.	Inches.
Sandstone				
Slate, full of iron ore nodules			1	6
Slate, gray			1	6
Coal, gas	1′	1″		
Bone	0	2		
Coal, gas	1	3		
Slate, gray	0	2		
Coal, gas	1	6		
Coal, hard (slate floor)	0	6	4	8

Teets reports this seam as being 46 feet by hand-level below the bed at Mine No. 34.

D. B. Reger, of the Survey Staff, also measured a section of the coal in Room No. 2, 4th Left, of above mine, as follows:

					Feet.	Inches.
1.	Slate, dark					
2.	**Coal**, cannel	0′	2″			
3.	**Coal**, soft	1	3			
4.	Slate, bony	0	3			
5.	**Coal**, soft	1	0			
6.	Slate, gray, 0½″ to	0	1			
7.	**Coal**, soft (slate pavement)	2	8	**No. 2 Gas**	5	5

"No. 1 (Buck Run) Mine; Principal office, Ansted, W. Va.; coal owned by operating company; daily capacity, 500 tons; coal used for railroad fuel and also shipped south for city gas works; number of men employed, 40 miners and 35 laborers; butts, N. 40° E.; faces, N. 50° W.; greatest rise, southeast; electric haulage; E. L. Morris, Superintendent, authority for data."

Mr. Reger also collected a sample (340R) from Nos. 3, 5, and 7 of the above section for analysis, the composition of which, as reported by Messrs. Hite and Krak, is given under **Mine No. 35** in Table 1 at the end of this Chapter.

Gauley Mountain Coal Co. No. 2 Mine—No. 36 on Map II.

On east hillside of Rich Creek, ½ mile southeast from Gauley River; **Campbell Creek (Peerless) Coal**; elevation, 1160′ B.; examined by Teets and Reger.

				Feet.	Inches.
Slate, brown					
Coal, gas	2′	10″			
Slate	0	1			
Coal, harder	0	10	**Peerless**	3	9
Slate					

Mr. D. B. Reger, of the Survey Staff, also measured a section of the coal at the above mine, in No. 1 Heading, 1000 feet in, as follows:

					Feet.	Inches.
1.	Slate, dark, with streaks of coal				1	0
2.	**Coal**, slaty	0′	3 ″			
3.	**Coal**, soft, good	3	1			
4.	Slate, bony	0	1½			
5.	**Coal**, soft, (slate pavement)	0	9½	**Peerless**	4	3

"Mine capacity, 150 tons (just in development stage); coal used for railroad fuel and also shipped south for city gas works; number of men employed, 20 miners and 12 laborers; butts, N. 40° E.; faces, N. 50° W.; greatest rise, southeast; electric haulage; E. L. Morris, Superintendent, authority for data."

Mr. Reger also collected a sample (338R) of the coal from Nos. 3 and 5 of the section last given for analysis, the composition of which, as reported by Messrs. Hite and Krak, is given under **Mine No. 36** in Table 1 at the end of this Chapter.

The bed was also measured and sampled on May 17, 1910, by W. R. Calvert, of the U. S. Geological Survey, 140 feet in drift, the section being published by the U. S. Bureau of Mines in Bulletin 22, page 909, and the chemical analysis on page 223 of the same Bulletin. The "A. R." analysis (10476) is republished in the present Report under **No. 36** in Table 3 at the end of this Chapter.

Gauley Mountain Coal Co. Opening—No. 298 on Map II.

On west hillside of branch of Rich Creek, 0.8 mile S. 30° W. of Mine No. 36; **Campbell Creek (Peerless) Coal**; elevation, 1210′ B.; examined by Teets.

				Feet.	Inches.
Shale, slaty, visible				8	0
Coal	2′	10″			
Slate, gray	0	1			
Coal	0	7	**Peerless**	3	6

Gauley Mountain Coal Co. Opening—No. 299 on Map II.

On east hillside of Rich Creek, opposite mouth of Bridge Fork; **Campbell Creek (Peerless) Coal**; elevation, 1280′ B.; section as reported; examined by Teets.

				Feet.	Inches.
Coal, gas (slate roof)	2′	8½″			
Slate	0	1			
Coal	0	9	**Peerless**	3	6½

Gauley Mountain Coal Co. Opening—No. 300 on Map II.

On west hillside of Rich Creek, ¼ mile west of Romont and mouth of Kelly Fork; **Campbell Creek (No. 2 Gas) Coal**; elevation, 1650′ B.; examined by Teets.

				Feet.	Inches.
Coal, (slate roof)	2′	5″			
Bone	0	3			
Coal	2	1	**No. 2 Gas**	4	9

Gauley Mountain Coal Co. Mine—No. 37 on Map II.

On head of Rich Creek, 2¼ miles N. 25° W. of Ansted; **Campbell Creek (No. 2 Gas) Coal**; elevation, 1600′ B.; examined by Teets.

					Feet.	Inches.
1.	Slate, dark, cannelly					
2.	**Coal**	2′	3″	Not Mined (4′ 0″)		
3.	Slate	0	10			
4.	**Coal**	0	3			
5.	Slate	0	4			
6.	**Coal**	0	1			
7.	Slate	0	3			
8.	**Coal**, gas	3	2	(4′ 8″)		
9.	Slate	0	1			
10.	**Coal** (slate floor)	1	5		8	8

Only Nos. 8, 9 and 10 are mined at the above opening.

Coal Digging—No. 301 on Map II, ¾ mile west of Sugar Creek and 4 miles north of Ansted; **Campbell Creek (No. 2 Gas) Coal**; elevation, 1630′ B.; examined by the author, was closed and thickness not learned.

Henry Cole Coal Opening—No. 302 on Map II.

On head of Sugar Creek, 2 miles N. 50° E. of Ansted; **Campbell Creek (No. 2 Gas) Coal**; elevation, 1920′ B.; examined by the author.

			Feet.	Inches.
Shale, argillaceous, visible			1	0
Coal, soft, columnar	0′	8″		
Slate, gray, hard	0	1		
Coal, soft, columnar	0	9		
Slate, gray, ¼″ to	0	0½		
Coal	0	2		
Slate, dark-gray	0	2		
Coal, medium-hard, columnar, (slate floor)	2	7	4	5½

J. F. Cavendish Coal Opening—No. 303 on Map II.

In edge of Nicholas County 1.1 miles N. 10° E. of Albion; **Campbell Creek (No. 2 Gas) Coal**; elevation, 1760′ B.; examined by the author.

					Feet.	Inches.
Coal, gas, medium-soft			0′	9″		
Shale, gray	1′	3″				
Coal	0	1				
Shale, gray	0	5	1	9		
Coal, gas, medium-soft			0	6		
Bone, sulphur			0	2		
Coal, gas, medium-soft			1	3	4	5

The stratigraphic position of the coal at the above opening is exhibited in the Albion Section in Chapter IV, page 139.

James Cole Coal Opening—No. 303A on Map II.

On north hillside of Cane Branch, 1 mile southeast of Gauley Bridge; **Campbell Creek (No. 2 Gas) Coal**; elevation, 1525′ B.; examined by Teets.

			Feet.	Inches.
Coal	1′	2″		
Bone	0	2		
Coal	0	11		
Slate	0	1½		
Coal	1	5½	3	10

The stratigraphic position of the coal at the above opening is exhibited in the Gauley Bridge—1 Mile Southeast Section in Chapter IV, page 128.

Philip Estep Coal Opening—No. 303B on Map II.

On north hillside of Cane Branch, 2.4 miles N. 85° E. of Gauley Bridge; **Campbell Creek (No. 2 Gas) Coal**; elevation, 1600′ B.; examined by Teets.

	Feet.	Inches.
Coal, (sandstone roof) (sandy shale floor)......	3	4

Kanawha District.

In Kanawha District, the Campbell Creek Coal, including both the Peerless and No. 2 Gas members, lies above drainage and covers a large portion of the District as shown on Map II and Figure 13, thus rendering a large tonnage of coal easily available to drift openings. Its thickness and stratigraphic position are exhibited in the sections published in Chapter IV for Crescent, Mt. Carbon, Beckwith, Columbia, Columbia—1.2 Miles Southwest, Powellton—½ Mile Northwest, Powellton, Head of Powellton Fork, Page, Keeferton, Kingston—1.7 Miles West, and Kingston, references to which are given in the Index; and in the logs of Coal Test Borings Nos. 1 and 12, pages 390 and 397, respectively.

Its description at 50 to 55 commercial mines, prospect openings and other exposures now follows:

Kanawha Rail & River Coal Co. Mecca Mine—
No. 38 on Map II.

On south bank of Schuyler Fork, ¼ mile southeast of Donwood; **Campbell Creek (No. 2 Gas) Coal**; elevation, 830′ B.; examined by the author.

				Feet.	Inches.
1.	Slate				
2.	**Coal**, soft......................	0′	5″		
3.	Slate	0	0¾		
4.	**Coal**, soft......................	0	9		
5.	**Coal**, splint....................	0	3		
6.	**Coal**, soft......................	0	8		
7.	Slate and **coal**.................	0	4¾		
8.	**Coal**, soft......................	2	5		
9.	Slate	0	0½		
10.	**Coal**, soft......................	0	9 ...	5	9
11.	Fire clay................................				

"Butts, N. 81° E.; faces, S. 9° E.; greatest rise, S. 40° E.; mine capacity, 300 tons; men employed, 75; coal shipped east and west for steam and domestic purposes; sample from Nos. 4, 5, 6, 8 and 10, and a portion of No. 7, the analysis of which was published under No. 6 on pages 393-4 of Volume II(A) by Dr. White and republished under the same number on page 264 of Bulletin 2 of the Survey."

The above information was taken from page 369 of Volume II(A), the section having been measured by the writer in 1907, when the mine was owned by Carver Bros. It was later operated by the Mecca Colliery Company, but has been shut down about five years. This mine is now connected up with the Edgewater No. 2 Mine (No. 43 on Map II) of the same company and coal is drawn through hill. The mine was operated for a period of about 30 years.

The analysis mentioned above is republished in this Report under **No. 38** in Table 1 at the end of this Chapter.

Eureka Coal Co. Mine No. 1—No. 39 on Map II.

On west bank of Morris Creek, ¼ mile south of Donwood; **Campbell Creek (No. 2 Gas) Coal**; elevation, 820′ B.; examined by the author.

					Feet.	Inches.
1.	Shale, buff, argillaceous, visible				15	0
2.	**Coal, gas, Peerless**				2	6
3.	Shale, black, plant fossils, 5″ to				0	10
4.	**Coal, gas**	2′	7″			
5.	Shale, dark-gray	0′	3″			
6.	**Coal, bony**	0	3			
7.	Shale, dark-gray	0	5	0 11		
8.	**Coal, soft,** (slate floor)	3	2	**No. 2 Gas**	6	8

Only Nos. 2 and 4 are being mined at present, although Mr. M. B. Welch says the bottom bench, No. 8, is the best coal, being lower in sulphur and ash.

The analysis of a sample of the coal collected from this mine by Messrs. R. W. Edmonds and A. P. Brady, as reported by Prof. Hite, was published by Dr. White under No. 13 on pages 572-3 of Volume II of the Survey and republished by him under the same number on page 365 of Volume II(A) and page 263 of Bulletin 2. This analysis is given under **No. 39** in Table 1 at the end of this Chapter.

Eureka Coal Co. No. 2 Mine—No. 40 on Map II.

On east bank of Morris Creek, ½ mile south of Donwood; **Campbell Creek (No. 2 Gas) Coal**; elevation, 850′ B.; examined by the author.

				Feet.	Inches.
Sandstone					
Shale, buff, visible				7	0
Coal, gas, Peerless				2	6
Shale, dark, argillaceous, plant fossils				8	0
Coal, gas	0′	1″			
Slate	0	4			
Coal, gas	1	8			
Shale, gray, dark	0	3			
Coal, bony	0	3			
Shale, gray, dark	0	4			
Coal, gas, (slate floor)	3	0	**No. 2 Gas**	5	11

Eureka Coal Co. No. 6 Mine—No. 41 on Map II, on east bank of Morris Creek, 0.8 mile south of Donwood; **Campbell Creek (No. 2 Gas) Coal**; elevation, 860′ B., examined by the author, was first opened on bottom two benches on No. 2 Gas member and then a slate parting developed to 7 feet between them, and then top two benches were mined (including Peerless and upper bench of No. 2 Gas), leaving the bottom bench. It was formerly operated by Morris Creek Coal Company.

W. R. Johnson No. 2 Mine (Abandoned)—No. 42 on Map II.

On west hillside of Kanawha River, at Crescent; **Campbell Creek (No. 2 Gas) Coal**; elevation, 810′ L.; examined by the author.

	Feet.	Inches.
Coal, opening closed and abandoned	5	0

The coal has been mined out at the above mine. The analysis of a sample of coal collected by Messrs. Edmonds and Brady here as analyzed by Prof. Hite and published by Dr. White under No. 11 on pages 572-3 of Volume II of the Survey and republished by him under the same number on page 365 of Volume II(A) and page 263 of Bulletin 2, is given under **No. 42** in Table 1 at the end of this Chapter.

The stratigraphic position of the coal at the above mine is shown in the Crescent Section, page 145.

Kanawha Rail & River Coal Co.—Edgewater No. 2 Mine—No. 43 on Map II.

On west hillside of Kanawha River, ¼ mile northwest of Eagle; **Campbell Creek (No. 2 Gas) Coal**; elevation, 895′ B.; examined by the author.

				Feet.	Inches.
Coal, blossom, Alma				1	0
Shale, buff, iron ore nodules				10	0
Sandstone				4	0
Shale, sandy				1	0
Coal, Peerless					
Shale, dark				11	0
Coal, gas	0′	8″			
Coal, splint	0	5			
Coal, gas	3	6			
Coal, gas, hard	0	7	**No. 2 Gas**	5	2
Fire clay shale				2	0

The old No. 2 Gas Coal mine—No. 38 on Map II—described on pages 521-2, is now connected up with Edgewater No. 2 Mine above and coal is drawn through hill. Employ 120 miners and laborers; output 400 short tons; shipped both east and west for steam and gas purposes; gives good results in by-product use; authority for mine data, J. N. Gellatty, President and General Manager. This mine was formerly operated by Carver Brothers and later by the Mecca Colliery Company. This mine has been in operation for over 40 years.

The analysis of a sample of coal collected at the above mine by Messrs. Edmonds and Brady and analyzed by Prof. Hite was published by Dr. White under No. 19 on pages 572-3 of Volume II and republished by him under the same number on pages 365-6 of Volume II(A) and page 263 of Bulletin 2 of the Survey. This analysis is given under **No. 43** in Table 1 at the end of this Chapter.

St. Clair Colliery Co.—Mine No. 44 on Map II, on west hillside of Kanawha River, at Eagle; **Campbell Creek (No. 2 Gas) Coal;** elevation, 955′ B.; examined by the author, was formerly operated by the Gordon Coal and Coke Company, and when sampled for analysis was known as No. 2 mine of St. Clair Coal and Coke Company. See No. 20, Volume II, page 573.

The analysis of a sample of coal collected by Messrs. Edmonds and Brady and analyzed by Prof. Hite was published by Dr. White under No. 20 on pages 572-3 of Volume II of the Survey and republished by him under the same number on pages 365-6 of Volume II(A) and page 263 of Bulletin 2. This analysis is given under **No. 44** in Table 1 at the end of this Chapter.

Kanawha Rail & River Coal Co. Diamond Mine—No. 45 on Map II.

On west hillside of Kanawha River, ½ mile due west of Boomer; **Campbell Creek (No. 2 Gas) Coal**; elevation, 1010′ B.; section measured at entrance by author.

				Feet.	Inches.
Sandstone, visible				5	0
Shale, sandy, and flaggy				7	0
Coal, Alma (1037′ B.)				1	10
Shale, sandy				2	0
Limestone, **Campbell Creek**, lenticular, 0″ to				2	0
Shale, buff, iron ore nodules abundant				7	0
Coal, gas, Peerless				1	10
Shale, black, siliceous, plant fossils and **Lingula fossils**				9	0
Coal, gas	1′	7″			
Slate, gray	0	1			
Coal, gas	3	6	**No. 2 Gas**	5	2
Shale, gray				1	0

The above mine was first operated by Carver Brothers and later by the Mecca Colliery Company. It has been operated by the present owners since March, 1916.

The author also measured a section at the above mine about 1907 at Opening No. 5 in Tucker Hollow, ½ mile northwest of Kimberly, as published by Dr. White on page 370 of Volume II(A) of the Survey, as follows:

				Feet.	Inches.
1.	Sandstone, massive, and shale			75	0
2.	**Coal, Peerless, soft**, streaks of sulphur			2	10
3.	State, 6 inches to 20 feet			1	3
4.	**Coal**, soft	0′	2″		
5.	Slate, black	0	1		
6.	**Coal**, soft	1	4		
7.	Slate, black	0	3		
8.	**Coal**, gas (slate floor)	3	5	5	3

"Elevation, 1040′ B.; Butts, N. 81° E.; faces S. 9° E.; greatest rise, S. 45° E.; mine capacity, 350 tons; men employed, 60; coal shipped west by rail and river, and east by rail for steam and gas; mine expected soon to have capacity of 1,000 tons daily; sample from Nos. 4 and 6, the analysis of which was published under No. 7 on page 395 of Volume II(A) and republished by Dr. White under the same number on page 264 of Bulletin 2."

The above-mentioned analysis is given under **No. 45** in Table 1 at the end of this Chapter.

The Peerless Coal is not mined here, since it has considerable sulphur and clinkers badly. The slates separating it from the underlying No. 2 Gas Coal proper are in places only 6 to 10 inches thick, and the overlying coal is left as the roof.

The author also took another section of the same measures at the "Knuckle" of the incline, ¼ mile northeast of No. 5 Opening, which gives the following, as published by I. C. White on page 370 of Volume II(A):

		Feet.	Inches.
1.	Sandstone, massive........................	100	0
2.	**Coal, Peerless, soft**........................	1	6
3.	Shales, sandy, dark........................	10	0
4.	**Coal, soft**................................	1	0
5.	Shale, dark, sandy........................	6	0
6.	**Coal, No. 2 Gas**............................	5	0

> "No. 2 of this section is, according to Mr. Hennen, the same bed of coal as No. 2, at the No. 5 Opening, while No. 4 is very irregular and disappears entirely to the southwest."

The analysis of a sample from this mine, collected by Messrs. Edmonds and Brady and analyzed by Prof. Hite and published by Dr. White under No. 21 on pages 572-3 of Volume II and under the same number on pages 365-6 of Volume II(A) and page 263 of Bulletin 2, is given under **No. 45** (first line) in Table 1 at the end of this Chapter. This analysis was published in Volume II under the name of the Diamond and Forest Hill Colliery Company.

M. B. Coal & Coke Co. Kimberly Mine--No. 49 on Map II.

On west hillside of Armstrong Creek, ⅛ mile south of Tucker Hollow; **Campbell Creek (No. 2 Gas) Coal**; elevation, 1100' B.; section at entrance; used in Kimberly Section; examined by the author.

					Feet.	Inches.
1.	Shale, buff, sandy, visible..................				12	0
2.	**Limestone, Campbell Creek,** in lenses, 0" to..				1	3
3.	Shale, buff, siliceous, iron ore nodules.......				13	0
4.	**Coal, gas, Peerless**........................				2	9
5.	Slate, black, with thin coal streaks..........				0	2
6.	**Coal, columnar, medium-hard**	1'	6"			
7.	Slate, gray.................	0	3			
8.	**Coal, columnar, medium-hard**	3	6	**No. 2 Gas**	5	3
9.	Shale, gray, pavement, visible..............				1	0

William Robinson, Temporary Foreman, says that only Nos. 6 and 8 are mined, and that slate, No. 3 of section, averages 3 to 4 inches, and that slate, No. 5, thickens up to 12 feet of black, soft slate.

The author also measured a section at the above mine in 1907, then operated by the Cardiff Coal Company, which was published by Dr. White on pages 370-1 of Volume II(A), as follows:

					Feet.	Inches.
1.	Sandstone					
2.	**Coal, Peerless, soft**				3	1
3.	Slate, black, 3" to				1	6
4.	**Coal, gas**	1'	1"			
5.	Slate, black, 1" to	0	3			
6.	**Coal, soft, gas**	0	8			
7.	**Coal,** semi-splint	0	1			
8.	**Coal,** soft, gas (slate floor)	3	2	**No. 2 Gas**	5	3

"Butts, N. 81° E.; faces, S. 9° E.; greatest rise, S. 9° E.; mine capacity, 400 tons; men employed, 75; coal shipped east and west for steam and domestic purposes; sample from Nos. 4, 6, 7 and 8, and also a separate sample for No. 2, the analyses of which were published under Nos. 9 and 8, respectively, on page 394 of Volume II(A) and republished by Dr. White under the same numbers on page 264 of Bulletin 2 of the Survey. The Peerless Coal, No. 2, is taken down only in the main entries, and then only when the parting slate below is thin. It is left for the roof, although the analysis shows it to be a coal of most excellent quality, and but slightly inferior to the main No. 2 Gas Coal below; authority for mine data, Frank Williams, Mine Foreman."

The above-mentioned analyses are republished under **No. 49** in Table 1 at the end of this Chapter.

M. B. Coal & Coke Co. Columbia Mine—No. 50 on Map II.

On west hillside of Armstrong Creek, 0.2 mile west of Columbia; **Campbell Creek (No. 2 Gas) Coal**; elevation, 1145' B.; used in Columbia Section; section at entrance by author.

				Feet.	Inches.
Shale, buff, sandy, visible				4	0
Coal, Peerless				2	6
Shale, dark-gray, argillaceous, plant fossils abundant				15	0
Coal, gas	0'	9 "			
Shale, gray	0	4			
Coal, gas	0	5			
Slate, yellowish-gray	0	0½			
Coal, gas, visible	2	6			
Coal	1	0	**No. 2 Gas**	5	0½

The above mine was formerly operated by the Cardiff Coal Company, the change in ownership taking place in 1907, when the author also measured another section at this mine and sampled same, the results being published by Dr. White on page 371 of Volume II(A), as follows:

					Feet.	Inches.
1.	Slate, good roof					
2.	Coal, gas	0′	7 ″			
3.	Slate, black	0	4			
4.	Coal, gas	0	4			
5.	Slate, gray	0	0½			
6.	Coal, gas	2	2			
7.	"Mother" coal, 0″ to	0	0½			
8.	Coal, gas	0	7	No. 2 Gas	4	1
9.	Slate, concealed, and massive sandstone				130	0
10.	Coal, Eagle, old opening fallen shut					

"Greatest rise, S. 45° E.; mine capacity, 250 tons; men employed, 35; coal shipped mostly east for steam and domestic purposes; authority for mine data, Walter Gill, Mine Foreman; sample from Nos. 2, 4, 6, 7, and 8, the analysis of which was published under No. 10 on page 394 of Volume II(A) and republished under the same number on page 264 of Bulletin 2."

The above-mentioned analysis is given under **Mine No. 50** in Table 1 at the end of this Chapter. This opening is abandoned now, since it is connected up with the Kimberly Mine (**No. 49**) underground.

Coal Exposure—No. 304 on Map II.

On branch of Jenkins Fork, 1.2 miles S. 50° W. of Columbia; **Campbell Creek (No. 2 Gas) Coal**; elevation, 1120′ B.; used in Columbia—1.2 Miles Southwest Section; examined by the author.

				Feet.	Inches.
Coal, gas, bright, **Peerless**				2	10
Slate, black				1	7
Coal, gas	1′	8″			
Shale, gray	0	10			
Coal, gas	0	9			
Shale, gray	0	3			
Coal, gas	3	7	No. 2 Gas	7	1
Shale, gray				5	0
Coal, Lower Campbell Creek					

Coal Exposure—No. 305 on Map II, examined by the author on the east hillside of Powellton Fork, ¼ mile northeast of Powellton, in the **Campbell Creek (No. 2 Gas) Coal**, at an elevation of 1425′ B., is shown in the Powellton Section, page 159.

Mt. Carbon Co. Ltd. Pluto Mine—No. 16A on Map II.

On head of Powellton Fork, ⅛ mile southwest of Woodrum Branch; **Peerless Coal**; elevation, 1725′ B.; used in Head of Powellton Fork Section, page 161; section at entrance by author.

	Feet	Inches.
Shale, buff, sandy	8	0
Sandstone	2	0
Shale, buff, sandy	9	0
Coal, medium-soft, bottom columnar, slate, gray floor)	4	0

The above mine is straight up hill S. 30° E. of the South Vulcan Mine (No. 59 on Map II) of the same Company in the Powellton Coal, 109 feet by hand-level. This is a new mine, just starting up, but shut down at the time of the writer's visit in 1916 on account of floods.

Great Kanawha Colliery Co. No. 2 Mine (Abandoned)—
No. 46 on Map II.

On southwest hillside of Kanawha River, at Mt. Carbon; **Campbell Creek (No. 2 Gas) Coal**; elevation, 1150′ B.; examined by author.

			Feet.	Inches.
Shale, argillaceous, visible			6	0
Shale, bluish-black, siliceous, Lingula fossils abundant			13	0
Coal, medium-soft	1′	1″		
Shale, gray	0	2		
Coal, medium-soft	1	0		
Coal, semi-splint	0	6		
Coal, medium-soft	1	1	3	10
Shale, gray			0	7

The above section was measured by the writer at the drift to the old mine, abandoned in December, 1915, after having been in operation for 30 years.

A sample of the coal from the above mine was collected by Messrs. Edmonds and Brady and analyzed by Prof. Hite, the results being published by Dr. White under No. 15 on pages 572-3 of Volume II, and republished by him under the same number on page 365 of Volume II(A) and page 263 of

Bulletin 2 of the Survey. This analysis is given under **Mine No. 46** in Table 1 at the end of this Chapter.

The analysis of a sample of the coke made at the above mine collected by Messrs. Edmonds and Brady and analyzed by Prof. Hite and published by Dr. White under No. 5 on page 574 of Volume II and republished on page 366 of Volume II(A) and page 264 of Bulletin 2 of the Survey under the same number, is given under **No. 46** in Table 2 at the end of this Chapter.

Great Kanawha Colliery Co. Digby Mine (Abandoned)—No. 47 on Map II.

On southwest hillside of Kanawha River, ½ mile southeast of Mt. Carbon; **Campbell Creek (No. 2 Gas) Coal**; elevation, 1230′ B.; examined by author.

					Feet.	Inches.
1.	Sandstone, greenish-gray, iron ore nodules				25	0
2.	**Coal, Peerless, 10″ to**	1′	1″			
3.	Shale, dark-gray, thin **coal** streaks	0	4			
4.	**Coal, gas, medium-soft**	0	8			
5.	**Coal, splinty**	1	1	**No. 2 Gas**		
6.	**Coal, gas, soft, columnar**	1	2	(1230′ B.)	4	4
7.	Shale, sandy				10	0
8.	**Coal**	0′	3″	**Lower**		
9.	Fire clay shale	1	10	**Campbell**		
10.	**Coal**	0	10	**Creek**	2	11
11.	Fire clay shale, visible				2	0

The above mine has been abandoned for about 10 years on account of slate, No. 3 of section thickening up to 11 inches.

An analysis of a sample of coal from the above mine, collected by Messrs. R. W. Edmonds and A. P. Brady, analyzed by Prof. Hite, and published by Dr. White under No. 14 on pages 572-3 of Volume II of the Survey and republished by him under the same number on page 365 of Volume II(A) and page 263 of Bulletin 2, is given under **Mine No. 47** in Table 1 at the end of this Chapter.

Coal Prospect—No. 306 on Map II.

In ravine on south hillside of Kanawha River, 1.5 miles S. 60° E. of Deepwater; **Campbell Creek (No. 2 Gas) Coal**; elevation, 1425′ B.; examined by the author.

			Feet.	Inches.
Sandstone, current-bedded, visible			5	0
Coal, gas	0′	11″		
Coal, splinty	0	5		
Shale, gray, 4″ to	0	5		
Coal, splint	0	11		
Shale, gray	0	0½		
Coal	0	2	2	10½

Kilbourne & Jacobs Coal Prospect—No. 307 on Map II.

On point, south hillside of Kanawha River, 1.9 miles S. 75° E. of Deepwater; **Campbell Creek (No. 2 Gas) Coal**; elevation, 1525′ B.; examined by the author.

			Feet.	Inches.
Shale, sandy, buff, visible			4	0
Coal, gas	3′	0″		
Shale, gray	0	2		
Coal, gas (slate, gray, floor)	1	5	4	7

Coal Prospect—No. 308 on Map II.

On east hillside of Lee Branch, 1.5 miles due south of Kanawha Falls; **Campbell Creek (No. 2 Gas) Coal**; elevation, 1635′ B.; examined by the author.

					Feet.	Inches.
Shale, buff, iron ore nodules, visible					4	0
Coal, gas, columnar			2′	9″		
Shale, gray, argillaceous	0′	3½″				
Coal, gas	0	2				
Shale, gray, argillaceous	0	3½	0	9		
Coal, gas (slate floor)			2	2	5	8

Kilbourne & Jacobs Coal Prospect—No. 309 on Map II.

On branch of Falls Creek, 1.4 miles S. 20° E. of Kanawha Falls; **Campbell Creek (No. 2 Gas) Coal**; elevation, 1665′ B.; examined by the author.

			Feet.	Inches.
Shale, buff			4	0
Coal, gas, **Peerless**	1′	4″		
Shale, gray, dark, ½″ to	0	1		
Coal, gas	0	10		
Fire clay, soft, 2″ to	0	5		
Coal, bony	0	3		
Fire clay shale	0	2		
Coal, gas, harder, (slate floor)	1	1	4	2

Gauley Mountain Coal Co.—Bud Blake, Lessee, Mine—No. 310 on Map II.

On head of Falls Creek, 2.4 miles S. 40° E. of Kanawha Falls; **Campbell Creek (No. 2 Gas) Coal**; elevation, 1800′ B.; examined by Teets.

		Feet.	Inches.
Sandstone, visible		8	0
Slaty shale		4	0
Coal, gas	3′ 5″		
Coal, bony	0 2		
Coal, gas (slate floor)	1 10	5	5

Mr. Blake mines about 4000 bushels annually from this opening.

The following section was measured by the author in March, 1907, at which time the company was about ready to begin coal shipments, as published by Dr. White on page 375 of Volume II(A):

Fort Defiance Coal & Coke Co. Mine—No. 48 on Map II.

On south hillside of Kanawha River, opposite Gauley Bridge; **Campbell Creek (No. 2 Gas) Coal**; elevation, 1390′ B.

				Feet.	Inches.
1.	Slate				
2.	**Coal, Peerless, soft**, visible at crop only			3	0
3.	Slate and shale at crop			2	6
4.	**Coal, soft**	3′ 6″	**No. 2 Gas** (1390′ B.)	5	8
5.	**Coal, splint, hard**	0 8			
6.	**Coal, soft**	1 6			
7.	Concealed			40	0
8.	**Coal**	1′ 10″	**Powellton**	4	2
9.	Fire clay	0 3			
10.	**Coal**	2 1			
11.	Shales and concealed			400	0
12.	Sandstone, massive and concealed to top of **Nuttall Sandstone** and base of **Kanawha Group**			220	0
13.	**Nuttall Sandstone** to bed of Great Kanawha River			60	0

"Elevation of No. 2 Gas Coal (spirit-level), 1390′; butts, N. 75″ E.; faces, S. 15° E.; greatest rise, S. 43° E.; sample from Nos. 4, 5, and 6, the analysis of which was published under No. 15 in table No. 5 on page 394 of Volume II(A) and republished by Dr. White under the same number on page 265 of Bulletin 2 of the Survey. The sample was taken from near the crop, and hence is high in oxygen. Mr. Philip Konrad, Secretary and Treasurer of the Fort Defiance Company, Kanawha Falls, is authority for the tide elevation of the No. 2 Gas Coal at this point."

"The Nuttall Sandstone makes the bed of the Great Kanawha River here, and it is over a hard ledge of the same where the river makes its vertical plunge at the celebrated 'Falls,' just below the line of Mr. Hennen's section.

"The 3 feet of coal just above the main No. 2 Gas is undoubtedly the same bed whose interval above the latter, on Morris Creek, Armstrong, and Loop, varies from 6 inches to 20 feet, and which the writer in 1884 identified with the Peerless member or division of the Campbell Creek Coal bed of the Malden region, 30 miles below. If we should add 700 feet to top of this section for the interval from No. 2 Gas Coal up to the top of the Roaring Creek Sandstone, above the Kanawha Black Flint, we get (670+700′) 1370 feet for the thickness of the Upper Pottsville, or Kanawha Group, the 700 feet being the thickness of these higher measures at Ansted, only a few miles distant, as determined by the careful instrumental measurements of Major Wm. N. Page. This total agrees very closely with the other measurements in the region, made by Major Page, Clark & Krebs, Mr. Hennen, and the writer."

The above-mentioned analysis is given under No. 48 in Table 1 at the end of this Chapter.

Gauley Mountain Coal Co.—J. A. Blake, Lessee—Coal Opening—No. 311 on Map II.

On head of Dempsey Branch, 2 miles S. 80° W. of Beckwith; **Campbell Creek (No. 2 Gas) Coal**; elevation, 1870′ B.; used in Beckwith—1.7 Miles West Section, page 150.

			Feet.	Inches.
Slate, sandy, iron ore nodules				
Coal, gas	0′	8″		
Coal, semi-splint	0	6		
Coal, gas	2	9		
Coal, splint	1	8	5	7

This coal bank is owned by Gauley Mountain Coal Company and leased and operated by J. A. Blake, about 2000 bushels being mined annually.

Loup Creek Colliery Co. Prospect—No. 312 on Map II.

On head of Demsey Branch, 1.9 miles S. 70° W. of Beckwith; **Campbell Creek (No. 2 Gas) Coal**; elevation, 1875′±; examined by C. E. Krebs.

	Feet.	Inches.
Coal	5	4

Loup Creek Colliery Co. Prospect—No. 313 on Map II.

On south hillside of Dempsey Branch, 1.6 miles northwest of Big Rock Knob; **Campbell Creek (No. 2 Gas) Coal**; elevation, 1790′±; examined by C. E. Krebs.

	Feet.	Inches.
Coal	4	4

Loup Creek Colliery Co. Prospect—No. 314 on Map II.

On northeast hillside of Coleman Branch, 1.1 miles northwest of Big Rock Knob; **Campbell Creek (No. 2 Gas) Coal**; elevation, 1835′±; examined by C. E. Krebs.

	Feet.	Inches.
Coal	5	0

Loup Creek Colliery Co. Prospect—No. 315 on Map II.

On extreme head of Coleman Branch, 0.3 mile northwest of Big Rock Knob; **Campbell Creek (No. 2 Gas)**; elevation, 1880′±; examined by C. E. Krebs.

	Feet.	Inches.
Coal	5	6

Loup Creek Colliery Co. Prospect—No. 316 on Map II.

On south hillside of Coleman Branch, 1.2 miles northwest of Big Rock Knob; **Campbell Creek (No. 2 Gas) Coal**; elevation, 1825′ B.; examined by C. E. Krebs.

	Feet.	Inches.
Coal	6	1

Loup Creek Colliery Co. Prospect—No. 317 on Map II.

On southwest hillside of Mulberry Fork, 0.7 mile northwest of Big Rock Knob; **Campbell Creek (No. 2 Gas) Coal**; elevation, 1865±; examined by C. E. Krebs.

	Feet.	Inches.
Coal	4	6

Loup Creek Colliery Co. Prospect—No. 318 on Map II.

On head of Mulberry Fork, 0.6 mile southwest of Big Rock Knob; **Campbell Creek (No. 2 Gas)**; elevation, 1900′±; examined by C. E. Krebs.

	Feet.	Inches.
Coal	6	8

Loup Creek Colliery Co. Prospect—No. 319 on Map II.

On Seng Branch of Mulberry Fork, 0.8 mile north of Ford Knob; **Campbell Creek (No. 2 Gas) Coal**; elevation, 1905′±; examined by C. E. Krebs.

			Feet.	Inches.
Coal	3′	6½″		
Shale	0	1¼		
Coal	0	3¼		
Shale	0	0¾		
Coal	0	11¼	4	11

Loup Creek Colliery Co. Prospect—No. 320 on Map II.

On east side of Sugarcamp Branch of Mulberry Fork, 0.45 mile N. 10° W. of Ford Knob; **Campbell Creek (No. 2 Gas) Coal**; elevation, 1950′±; examined by C. E. Krebs.

			Feet.	Inches.
Coal	3′	4¾″		
Shale	0	1¼		
Coal	0	3½		
Shale	0	1		
Coal	0	8	4	6½

Loup Creek Colliery Co. Prospect—No. 321 on Map II.

On southwest hillside of Mulberry Fork, 2.2 miles northwest of Ford Knob; **Campbell Creek (No. 2 Gas) Coal**; elevation, 1795′±; examined by C. E. Krebs.

			Feet.	Inches.
Coal	0′	6 ″		
Shale	0	2½		
Coal	4	6		
Shale	3	2½		
Coal	3	11½		
Shale	0	0¾		
Coal	0	4¼		
Shale	0	2		
Coal	0	9	13	8½

Loup Creek Colliery Co. Prospect—No. 322 on Map II.

On southwest hillside of Mulberry Fork, 2.9 miles northwest of Ford Knob; **Campbell Creek (No. 2 Gas) Coal**; elevation, 1725′±; examined by C. E. Krebs.

	Feet.	Inches.
Coal	5	0

Loup Creek Colliery Co. Prospect—No. 323 on Map II.

On northeast hillside of Beards Fork, 2.5 miles northwest of Ford Knob; **Campbell Creek (No. 2 Gas) Coal**; elevation, 1755'±; examined by C. E. Krebs.

			Feet.	Inches.
Coal	3'	3"		
Shale	1	5		
Coal	4	4		
Shale	0	6		
Coal	0	10	10	4

Loup Creek Colliery Co. Prospect—No. 324 on Map II.

On head of Beards Fork, ½ mile N. 70° W. of Ford Knob; **Campbell Creek (No. 2 Gas) Coal**; elevation, 1945'±; examined by C. E. Krebs

			Feet.	Inches.
Coal	1'	9"		
Shale	0	0½		
Coal	1	11½		
Shale	0	1		
Coal	0	4		
Shale	0	2½		
Shale	0	6	4	10½

Loup Creek Colliery Co. Prospect—No. 325 on Map II.

On Right Fork of Beards Fork, 1.4 miles S. 50° W. of Ford Knob; **Campbell Creek (No. 2 Gas) Coal**; elevation, 2000'±; examined by C. E. Krebs.

	Feet.	Inches.
Coal	4	9½

Loup Creek Colliery Co. Prospect—No. 326 on Map II.

On west hillside of Right Fork of Beards Fork, 1.7 miles S. 70° W. of Ford Knob; **Campbell Creek (No. 2 Gas) Coal**; elevation, 1955'±; examined by C. E. Krebs.

	Feet.	Inches.
Coal	4	3

Loup Creek Colliery Co. Prospect—No. 327 on Map II.

On west hillside of Right Fork of Beards Fork, 2.0 miles N. 70° E. of Page; **Campbell Creek (No. 2 Gas) Coal**; elevation, 1810'±; examined by C. E. Krebs.

	Feet.	Inches.
Coal	4	10½

Loup Creek Colliery Co. Beards Fork Mine—No. 51A on Map II.

On point, Beards Fork, 2.5 miles N. 70° E. of Page; **Campbell Creek (No. 2 Gas) Coal**; elevation, 1842′ L.; examined by C. E. Krebs.

	Feet.	Inches.
Coal (with partings?)	4	8 ±

A sample of the coal from the above mine was submitted by Mr. C. E. Krebs, of Charleston, West Virginia, the results of the analysis of which are given under **Mine No. 51A** in Table 1 at the end of this Chapter.

Loup Creek Colliery Co. Mine—No. 51B on Map II.

On Beards Fork, 3.0 miles N. 75° E. of Page; **Campbell Creek (No. 2 Gas) Coal**; elevation, 1859′ L.; examined by C. E. Krebs.

			Feet.	Inches.
Coal	3′	10 ″		
Shale	0	0½		
Coal	0	5		
Shale	0	4		
Coal	0	9	5	4½

Loup Creek Colliery Co. Prospect—No. 328 on Map II.

On west hillside of Beards Fork, 2.2 miles N. 45° E. of Page; **Campbell Creek (No. 2 Gas) Coal**; elevation, 1750′±; examined by C. E. Krebs.

				Feet.	Inches.
Coal, Peerless	5′	0½″			
Shale	1	1			
Coal	3	7½			
Shale	0	2	**Peerless and**		
Coal	0	6	**No. 2 Gas**	10	5

Loup Creek Colliery Co. Prospect—No. 329 on Map II.

On head of Branch of Beards Fork, 2.0 miles N. 50° E. of Page; **Campbell Creek (No. 2 Gas) Coal**; elevation, 1750′±; examined by C. E. Krebs.

			Feet.	Inches.
Coal, Peerless	5′	6″		
Shale	1	0		
Coal, No. 2 Gas	4	0	10	6

Loup Creek Colliery Co. Page Mine—No. 7 Opening—No. 51 on Map II.

On east side of Loop Creek, 1.6 miles northeast of Page; **Campbell Creek (No. 2 Gas) Coal**; elevation, 1716′ L.; examined by the author.

					Feet.	Inches.
1.	Sandstone roof........................					
2.	**Coal**, gas, soft........	3′ 1″	**Peerless**..	5′ 4″		
3.	**Coal**, splint............	1 1				
4.	**Coal**, soft, gas..........	1 2				
5.	Slate, gray, soft, 20′ to................			1 2		
6.	**Coal**, soft, gas..........	0′ 2″	**No. 2 Gas**	3 8		
7.	Bone	0 1			10	2
8.	**Coal**, soft, gas..........	3 5			——	

"Butts, N. 65° E.; faces, S. 25° E.; greatest rise (2 per cent.) S. 22½° E.; mine capacity, 875 tons; men employed, 231; about six-sevenths of the coal manufactured into coke, the balance shipped east and west for fuel; authority for mine data, J. R. C. Taylor, General Manager; one sample from Nos. 2, 3, and 4 and another from Nos. 6 and 8, the analyses of which were published under Nos. 11 and 12, respectively, in Table No. 5, pages 393-4 of Volume II(A). There can be very little doubt that Nos. 2, 3, and 4 represent the Peerless division of the old Campbell Creek bed since Mr. Hennen reports that the parting slate, No. 5, frequently thickens up to 15 or even 20 feet, and that then, only the upper or Peerless division is mined which is much better than to take out only the lower division, since it leaves a possibility of sometime taking out the lower or No. 2 Gas division proper, whereas if the lower were first mined, there would be little hope of ever recovering the upper one.

"It is interesting to compare the section of these coals here at Page with those at the Kimberly (No. 49 on Map II) and Diamond (No. 45 on Map II) mines on Armstrong Creek, sections of which have been given on preceding pages, where the parting shale between the Peerless division and No. 2 Gas Coal exhibits quite as great variations in thickness as at Page."

The foregoing data are taken from page 372 of Volume II(A) published by Dr. White in 1908, while the following are from page 344 of the same Report:

"The Eagle Coal also makes an excellent coke. At North Page, the coal from this bed is mixed with that from No. 2 Gas above, the whole being then pulverized by modern machinery and the mixture coked in beehive ovens, of which there are 505 in the plant of the Loup Creek Colliery Company. (At Mine 51 on Map II). Samples of coke from these ovens yielded the following results to the several chemists:

	1.	2.	3.
Moisture	0.28	0.38	0.16
Volatile Matter..............	0.22	0.96	3.06
Fixed Carbon................	89.13	95.19	90.90
Ash	10.37	3.47	5.88
Sulphur	1.15	0.94	0.716
Phosphorus	.....	.....	0.019

"1. Sample collected by J. R. C. Taylor, General Manager for Loup Creek Colliery Co., and analyzed by Hite & Patton.

"2. Analysis made in U. S. Geological Survey Fuel Testing Plant, St. Louis, Mo.

"3. Analysis by Froehling & Robertson, Richmond, Va."

The analyses of the samples of coal collected by the writer in 1907 mentioned above are given under **Mine No. 51** in Table 1 at the end of this Chapter.

Sections of the coal at the above mine were measured and samples collected by representatives of the U. S. Geological Survey as given on pages 936-8 of Bulletin 22 of the U. S. Bureau of Mines, the analyses being published on page 236 of the Bulletin mentioned, as follows:

Laboratory **No. 5439**, measured and sampled on October 5, 1907, by K. M. Way; thickness of bed 8′ 11½″; thickness of coal sampled, 8′ 2″; sample taken in room 16, off right entry, 1,100 feet northeast of opening.

Laboratory **No. 6933**, measured and sampled on December 17, 1908, by G. S. Pope; thickness of bed, 9′ 5⅝″; thickness of coal sampled, 8′ 5⅞″; sample taken from point 1,500 feet northeast of opening in room 22, off entry 6. "Sulphur" occurs with irregularity but in considerable quantities, both as partings and balls; in places mixed with mother coal. The rejected parting is a persistent layer of shale varying from 6 inches to a thickness such that the lower coal was not worked.

These analyses are published under **Mine No. 51** in Table 3 at the end of this Chapter.

Illuminating-gas tests of this coal were made by the U. S. Bureau of Mines as given in Bulletin 6, pages 39-40, 42, 43, 44, 45, 46, 47, 48, 49, and 50, of this Bureau, as follows:

Coal A. A. 5, From Kanawha No. 2 Bed, Page, W. Va.

"The sample consisted of 67 sacks of run-of-mine coal from the Kanawha No. 2 bed at Page, Fayette County, W. Va., on the Virginian Railway. G. S. Pope inspected the mine and shipped the sample. Tables 3 to 8 give the analyses of the samples and the results of tests 25 and 27.

"The coal as received was in fine lumps, fairly clean and with no slate or pyrite evident. Screening (¾-inch screen) removed a large proportion of the coal, 63.27 per cent. in one trial and 70 per cent. in the other, but the composition of the screenings and of the screened coal differed very little. The average ash content was 6.20 per cent. in the coal passing over the screen, and 6.57 per cent. in that falling through. This coal had a low percentage of volatile matter and a notably low content of oxygen, the lowest found in any of the coals tested.

"Two distillation tests were made, the retort being hot, and the conditions nearly the same in each. The yield of coke was high, a result from the low percentage of volatile matter in the coal, but was distinctly too high in test 25, the figure being 75.5 per cent., as against 71.25 per cent. in test 27. The sum of the products of distillation in test 25 is 101.7 per cent. of the weight of coal charged and the yields were uniformly higher, with the single exception of the ammonia liquor, in test 25 than in test 27. The obvious explanation is that the actual weight of the coal charged was more than the recorded weight. The stated yields of gas (5.20 and 5.5 cubic feet per pound), the candle-power (15.8 and 16.1), the candle-feet (82.2 and 89.5), and the heat values (617 and 622 B. T. U. per cubic foot, and 3,208 and 3,110 B. T. U. per pound of coal), check fairly well. They would agree better if the stated weight of coal charged in test 25 were correct. The yield of ammonia was noticeably higher in test 25 (5.19 pounds per ton) than in test 27 (4.38 pounds per ton). The apparent error in the weight of coal charged may partly account for the difference.

"Naphthalene was determined in test 27 and the result was the highest of any of the coals. Hydrogen sulphide in the unpurified gas at the outlet of the scrubber was determined in one test; it was twice as much as for the Pittsburgh Coal, though the latter did not contain a correspondingly higher percentage of sulphur. The weight balance of test 27 was about normal.

"These tests tend to confirm the apparently prevalent opinion that West Virginia coals in general give good gas but yield much naphthalene. Another opinion that they produce a pitchy tar which stops stand-pipes, could not be tested in the short runs made. Although the yield of naphthalene was large, the quantity in the gas at the outlet of the tar separator was not larger than in one of the tests with Pittsburgh Coal."

Test 25 (A. A. 5.)

Proximate Analyses.

Coal:	M.	Ash.	V. M.	F. C.	Sul.	B. T. U.
As received	1.28	5.57	30.65	62.50	1.53	14.531
Dry	....	5.64	31.05	63.31	1.55	14.720
Moisture and ash free	....	....	32.91	67.09	1.64	15,601

Ultimate Analyses.

Coal.	H.	C.	N.	O.	Sul.	Ash.
Dry	5.09	82.46	1.42	4.95	0.83	5.25
Moisture and ash free	5.37	87.03	1.50	5.22	0.88	....

Proximate Analyses.

Coke:	M.	Ash.	V. M.	F. C.	Sul.	B. T. U.
As received	22.59	9.37	0.38	67.66	0.66	9,855
Dry	.....	12.10	0.49	87.41	0.85	12,731
Moisture and ash free	.....	.....	0.56	99.44	0.97	14,485
Screenings:						
As received	1.50	7.71	29.45	61.34	1.45	14.161
Dry	.....	7.83	29.90	62.27	1.47	14.377
Moisture and ash free	.....	.....	32.44	67.56	1.59	15,599

(From Table 4.—Analyses and Composition of Coals.)

Coal as Charged.

Test 25	1.28	30.65	62.50	5.57	1.53	14.531
Test 27	1.27	29.02	62.88	6.83	1.18	14.344

Dry Coal.

Calculated proximate composition.

Test 25	....	21.05	63.31	5.64	1.55	14.720
Test 27	....	29.39	63.69	6.92	1.20	14.530

The ultimate analysis of Test 25 is also given, being the same as previously given under "Dry" Coal above, the following note being added: "The ultimate analyses are mostly of the mine samples, and hence differ from analyses of test samples, especially in the percentages of ash. The composition of the coal free from moisture and ash probably does not differ much."

Composition of Coals.

	Calculated proximate composition.				Calculated ultimate composition.				
	V. M.	F. C.	Sul.	B. T. U.	H.	C.	N.	O.	S.
Test 25	32.91	67.09	1.64	15,601	5.37	87.03	1.50	5.22	0.88
Test 27	31.57	68.43	1.29	15,610	....	.....	....	....	....

Table 5.—Retort operation, coal and coke.

	Test 25.	Test 27.
Coal:		
Per cent. rejected by ¾-inch bar screen	63.27	70.00
Screened, as charged (pounds)	400	400
Charged, dry (pounds)	395	394
Charged, ash and moisture free (pounds)	372	368
Coke:		
Yield (pounds)	302	285
Dry (per cent. of coal charged)	75.5	71.2
Dry (per cent. of dry coal charged)	76.5	72.4
Per cent. of Breeze through ¾-inch bar screen	10.0	7.6

Products of destructive distillation:

	V. M.	F. C.	Ash.	Sul.
Test 25	0.49	87.41	12.10	0.85
Test 27	0.73	86.01	13.26	1.19

	Test 25.	Test 27.
Heat value of coke (B. T. U	12.731	12,591
Carbonization period (hours)	4.52	4.50
Retort temperature (°F.):		
On top of coal at center of retort:		
After 1 hour	1,397	1,230
Maximum	1,710	1,725
Average at exterior	2,042	2.101

Table 6.—Yield, heating value and candle-power of gas.

	Test 25.	Test 27.
Yield of gas per pound of coal (cubic feet):		
Coal as charged	5.2	5.0
Dry coal	5.3	5.1
Coal, ash and moisture free	5.6	5.4
Calculated average heating value (B. T. U.):		
Gross	617	622
Net	555	557

	Test 25.	Test 27.
Calculated average candle-power	15.8*	16.1*
Calculated average gas analysis (per cent.):		
CO_2	1.3	1.2
C_nH_{2n}	3.8	3.2
O_2	0.9	0.6
CO	4.9	5.0
CH_4	32.9*	32.6
H_2	53.6*	55.1
N_2	2.6	1.8

Table 7.—Yield of tar, ammonia, sulphur, and naphthalene.

	Test 25.	Test 27.
Tar per ton of coal (gallons):		
Coal as charged	20.1	14.6
Dry coal	20.4	14.8
Coal, ash and moisture free	21.7	15.9
Ammonia (NH_3) per ton of coal (pounds):		
Coal as charged	5.19	4.37
Dry coal	5.26	4.43
Coal, ash and moisture free	5.57	4.75
Total naphthalene per ton of coal as charged (pounds)	....	11.4

Table 8.—Results of tests.

	Test 25.	Test 27.
Retort temperatures (°F.):		
Interior, after 1 hour	1,397	1,230
Interior, maximum	1,710	1,725
Exterior average	2,042	2,101
Average temperatures of condensing system (°F.):		
Condenser No. 1	112	116
Condenser No. 2	134	124
Condenser No. 3	105	114
Tar Extractor, Inlet	95	104
Tar Extractor, Outlet	81	92
Water in station meter	52	56
Gas leaving station meter	52	54
Carbonization period (hours)	4.50	4.50
Weight balance (pounds):		
Coal charged (pounds)	400	400
Coal charged (per cent.)	100	100
Coke made (pounds)	302	285
Coke made (per cent.)	75.5	71.2
Gas made (pounds)	56.0	51.0
Gas made (per cent.)	14.0	12.8
Tar made (pounds)	39.0	28.9
Tar made (per cent.)	9.7	7.2
Ammonia liquor (pounds)	10.1	15.3
Ammonia liquor (per cent.)	2.5	3.8
Unaccounted for (pounds)	—7.1	19.8
Unaccounted for (per cent.)	—1.7	5.0
Coke (per cent. of coal charged)	75.5	71.3
Gas:		
Per pound of coal charged (cubic feet, corrected)	5.20	5.00
Average candle-power (approximate)	15.8	16.1
Candle-feet per pound of coal	82.20	80.60

	Test 25.	**Test 27.**
Average heating value per cubic foot (B. T. U.):		
Gross	617	622
Net	555	557
Heating value per pound of coal (B. T. U.)	3,208	3,110
Average gas analyses (per cent):		
Carbon dioxide	1.3	1.2
Illuminants	3.8	3.3
Oxygen	0.9	0.6
Carbon monoxide	4.9	5.0
Methane	32.9*	32.6
Hydrogen	53.6*	55.5
Nitrogen	2.6	1.8
Tar per ton of coal charged (pounds):		
Collected from condenser	73.00	35.10
Collected from separator	117.20	104.90
Passing separator as fog	0.50	3.90
Total	190.70	143.90
Ammonia (NH_3) per ton of coal charged (pounds):		
Recovered from condenser liquor	0.74	0.59
Present in gas at inlet to tar separator	4.45	3.79
Total	5.19	4.38
Naphthalene per ton of coal charged (pounds):		
Dissolved in condenser	.....	2.41
Dissolved in separator tar	.....	8.11
Dissolved in tar fog in gas leaving separator	.....	0.63
As vapor in gas leaving separator	.....	0.27
Total	.....	11.42
Saturation temperature of gas leaving separator (°F.)	.....	66.0

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*One figure of the nine used in obtaining the average was supplied by interpolation.

The analyses of samples bearing the Government Laboratory Nos. 1867, 1868, 2177, and 2028, given in Table 3 at the end of this Chapter, are as taken from Bulletin 22, page 236, of the U. S. Bureau of Mines. Other calculations on "dried at temperature of 105° C." and "moisture and ash free" bases are given in the reference cited.

"Two mine samples (Nos. 1867 and 1868) were collected by E. W. Parker in 1905, and one sample (No. 2177) by J. W. Groves and W. J. Von Borries on September 22, 1905; thickness of bed, 10′ 1½″, thickness of coal sampled, 8′ 4″. Sample 2177 was taken from entry 6, 500 feet east of the mine opening. Sample 1867 was taken from the lower bench, from entry 5, 302 feet from the mine opening. Sample 1868 was taken from the upper bench. Sample 2028 was of run-of-mine coal collected from car at fuel testing plant.

"For results of tests of this coal, see mention of special tests as follows—steaming tests: U. S. Geol. Survey Bull. 290, p. 201; Bureau of Mines Bull. 23, pp. 69, 185, 186; producer-gas tests: U. S. Geol. Survey Bull. 290, p. 202; Bureau of Mines Bull. 13, pp. 219, 276; coking tests: U. S. Geol. Survey Bull. 290, p. 203; Bull. 336. pp. 25, 34, 43, 44; chemical analyses, Part I, Bull. 22, U. S. Bureau of Mines, p. 236; also U. S. Geol. Survey Bull. 290, p. 201."

Steaming Tests.

Test 179—Size as shipped, run of mine. Size as used, over 1 inch, 15.4 per cent.; ½ inch to 1 inch, 19.7 per cent.; ¼ inch to ½ inch, 22.4 per cent.; under ¼ inch, 42.5 per cent. Duration of test, 10 hours. Kind of grate, plain.

Test 180—Size as shipped, run of mine. Size as used, over 1 inch, 12.7 per cent.; ½ inch to 1 inch, 13.3 per cent.; ¼ inch to ½ inch, 19.6 per cent.; under ¼ inch, 54.4 per cent. Duration of test 9.95 hours. Kind of grate, plain.

Miscellaneous Items.	Test 179	Test 180
Heating value of coal....(B. T. U. per pound dry coal)	14,999	14,933
Force of draft:		
Under stack damper (inch water)	0.37	0.37
Above fire (inch water)	0.08	0.10
Furnace temperature (°F.)	2,428	2,312
Dry coal used per square foot of grate surface per hour (pounds)	16.47	15.19
Equivalent water evaporated per square foot of water-heating surface per hour (pounds)	3.45	3.22
Percentage of rated horse-power of boiler developed	96.8	90.1
Water apparently evaporated per pound of coal as fired (pounds)	8.71	8.69
Water evaporated from and at 212°F.:		
Per pound of coal as fired (pounds)	10.12	10.11
Per pound of dry coal (pounds)	10.50	10.59
Per pound of combustible	11.11	11.29
Efficiency of boiler, including grate (per cent.)	67.60	68.48
Coal as fired:		
Per indicated horse-power hour (pounds)	2.79	2.80
Per electrical horse-power hour (pounds)	3.46	3.45
Dry coal:		
Per indicated horse-power hour (pounds)	2.69	2.67
Per electrical horse-power hour (pounds)	3.32	3.30

Proximate Analyses.	Test 179	Test 180
Moisture	3.59	4.53
Volatile Matter	30.88	29.82
Fixed Carbon	61.69	61.38
Ash	3.84	4.27
Total	100.00	100.00
Sulphur	0.94	0.85

Ultimate Analyses.	Test 179	Test 180
*Carbon	83.64	83.30
*Hydrogen	5.09	5.07
*Oxygen	4.93	4.90
*Nitrogen	1.38	1.37
Sulphur	0.98	0.89
Ash	3.98	4.47
Total	100.00	100.00

*Figured from car sample.

Producer-Gas Test.

Size as shipped, run of mine. Size as used, over 1 inch, 25 per cent.; ½ inch to 1 inch, 42 per cent.; ¼ inch to ½ inch, 20 per cent.; under ¼ inch, 13 per cent. Duration of test, 50 hours.

Average electrical horse-power	200.5
Average B. T. U. gas per cubic foot	139.2
Total coal fired (pounds)	9,750

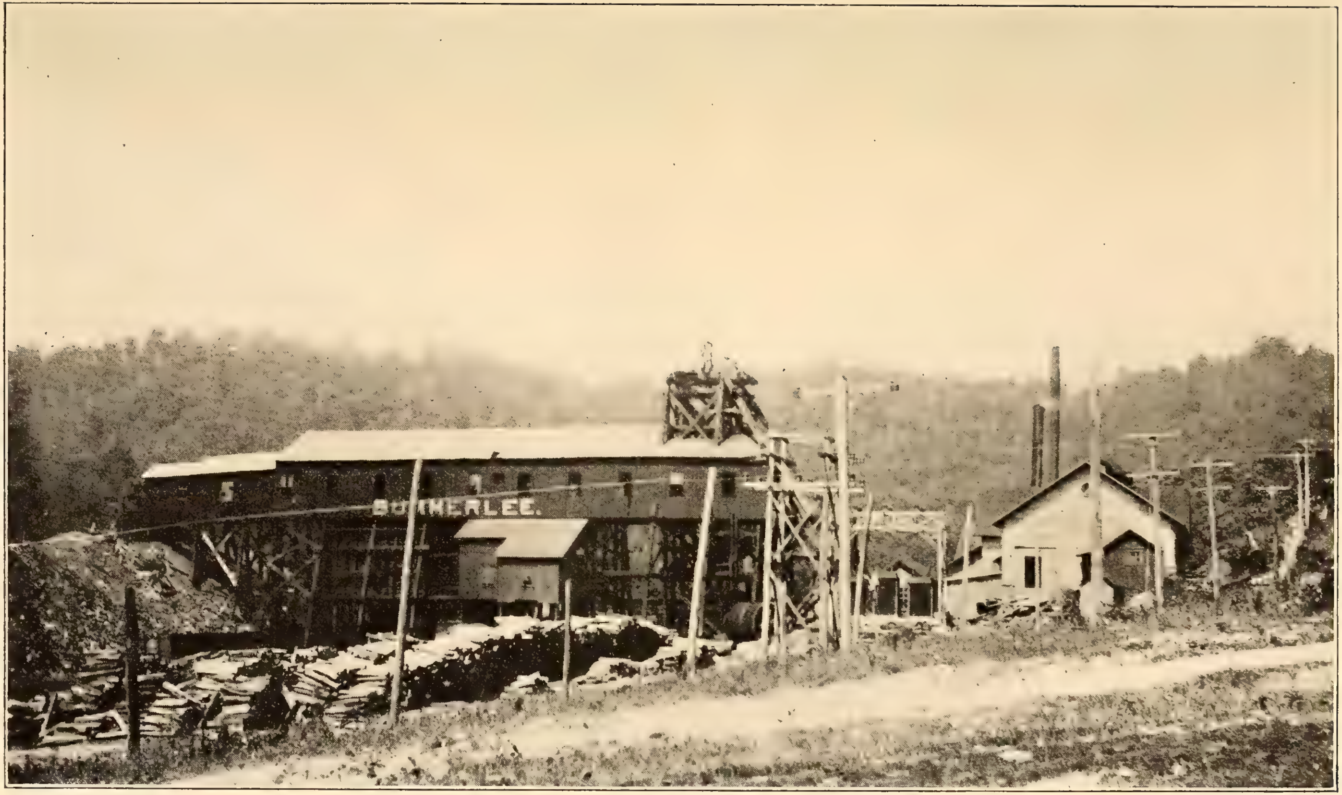

PLATE XVIII.—View showing coal tipple at Summerlee (formerly Parral) Shaft Mine—No. 144 on Map II—in the Sewell Coal bed (See Chapter XI for description.)

Coal Consumed in Producer (Pounds per Horse-Power per Hour). Test 56.

	Coal as Fired	Dry Coal	Combustible
Per electrical horse-power:			
Available for outside purposes	1.03	1.00	0.96
Developed at switchboard	0.97	0.95	0.91
Per brake horse-power:			
Available for outside purposes	0.87	0.85	0.82
Developed at engine	0.83	0.80	0.78

Equivalent used by producer plant.

	Coal as Fired	Dry Coal	Combustible
Per electrical horse-power:			
Available for outside purposes	1.10	1.07	1.03
Developed at switchboard	1.04	1.01	0.97
Per brake horse-power:			
Available for outside purposes	0.93	0.91	0.87
Developed at engine	0.88	0.86	0.83

Analyses, Test 56.

Coal.	
Moisture	2.65
Volatile Matter	31.00
Fixed Carbon	62.82
Ash	3.53
Total	100.00
Sulphur	0.82

Gas by volume.	
Carbon dioxide (CO_2)	9.8
Carbon monoxide (CO)	18.4
Hydrogen (H_2)	13.7
Methane (CH_4)	2.3
Nitrogen (N_2)	55.8
Total	100.0

Coking Tests.

Test 21, West Virginia No. 13.—Size as shipped, run of mine. Size as used, finely crushed. Raw. Duration of test, 84 hours.

Coal charged	12,000	pounds.
Coke produced	7,955	pounds.
Breeze produced	413	pounds.
Coke produced	66.29	per cent.
Breeze produced	3.44	per cent.
Total percentage yield	69.73	

Remarks.—Good, hard coke. Foundry coke. Light-gray and silvery color. High yield due to deposited carbon.

Test 23, West Virginia No. 13 (Mine 51) and No. 14 (Mine 79) mixed in equal proportions.—Size as shipped, run of mine. Size as used, finely crushed. Raw. Duration of test, 77 hours.

Coal charged	12,000	pounds.
Coke produced	8,093	pounds
Breeze produced	215	pounds.
Coke produced	67.44	per cent.
Breeze produced	1.79	per cent.
Total percentage yield	69.23	

Remarks.—Good, hard coke. Foundry coke. Light-gray and silvery color. High yield due to deposited carbon.

Analyses.

	Test 21		Test 23	
	Coal	Coke	Coal	Coke
Moisture	3.23	0.75	4.81	0.43
Volatile Matter	31.12	1.05	29.28	1.37
Fixed Carbon	61.98	93.36	62.84	94.20
Ash	3.67	4.84	3.07	4.00
Sulphur	0.86	0.77	0.89	0.84

The following details of coking tests of coals from Mines Nos. 51 and 79 on Map II are taken from U. S. Geological Survey Bulletin 336, Test 21 being from Mine No. 51 (No. 2 Gas); Test 23, from a mixture of the No. 2 Gas and Eagle Coals from Mines Nos. 51 and 79; and Test 20, from Mine No. 79 in the Eagle Coal:

	Test 21	Test 23	Test 20
Duration of test (hours)	84	77	71
Size of coal as shipped	r.o.m.	r.o.m.	r.o.m.
Size of coal, as used	f.c.	f.c.	f.c
Physical properties of coke:			
Specific gravity, real	1.84	1.85	1.92
Specific gravity, apparent	1.02	0.88	0.85
Pounds per cubic foot, dry	63.13	54.67	52.81
Pounds per cubic foot, as receivet (wet)	91.21	87.10	87.74
Percentage by volume, coke	55.00	48.00	44.00
Persentage by volume, cells	45.00	52.00	56.00
6-foot drop test: Percentage over 2-inch mesh:			
1	.....	96.00	95.50
2	.....	90.50	90.50
3	.....	87.00	88.50
4	.....	84.50	87.00
Weight of coal (pounds) (1)	12,000	12,000	11,000
Weight of coal (pounds) (2)	11,612	11,423	10,886
Production, coke (pounds) (1)	7,955	8,093	7,154
Production, coke (pounds) (2)	7,895	8,057	7,127
Production, breeze (pounds) (1)	413	215	364
Production, breeze (pounds) (2)	410	214	363
Production, coke (per cent.) (1)	66.29	67.44	65.04
Production, coke (per cent) (2)	67.99	70.53	65.47
Production, breeze (per cent.) (1)	3.44	1.79	3.31
Production, breeze (per cent.) (2)	3.53	1.87	3.33
Production, total (per cent.) (1)	69.73	69.23	68.35
Production, total (per cent.) (2)	71.52	72.40	68.80
Chemical analysis of coal:			
Moisture (1)	3.23	4.81	1.04
Moisture (2)	.....	.....	.....
Volatile Matter (1)	31.12	29.28	29.28
Volatile Matter (2)	32.16	30.76	29.59
Fixed Carbon (1)	61.98	62.84	66.80
Fixed Carbon (2)	64.05	66.02	67.50
Ash (1)	3.67	3.07	2.88

	Test 21	Test 23	Test 20
Ash (2)	3.79	3.22	2.91
Sulphur (1)	0.86	0.89	1.04
Sulphur (2)	0.89	0.93	1.05
Chemical analysis of coke:			
Moisture (1)	0.75	0.43	0.38
Moisture (2)	.....	.....	.....
Volatile Matter (1)	1.05	1.37	0.96
Volatile Matter (2)	1.06	1.38	0.97
Fixed Carbon (1)	93.36	94.20	95.19
Fixed Carbon (2)	94.07	94.61	95.55
Ash (1)	4.84	4.00	3.47
Ash (2)	4.87	4.01	3.48
Sulphur (1)	0.77	0.84	0.94
Sulphur (2)	0.78	0.84	0.94
Phosphorus (1)	0.0045	0.0057	0.0046
Phosphorus (2)	......	......	......

West Virginia No. 13—Test 21: Light-gray and silvery color; metallic ring; cell structure good; breakage good; long, large, heavy pieces.

West Virginia Nos. 13 and 14—Test 23: Light-gray and silvery color; metallic ring; structure medium; breakage good; long, large, heavy pieces.

West Virginia No. 14—Test 20: Light-gray and silvery color; metallic ring; cell structure a light large; breakage good; long, large heavy pieces; good hard coke.

Cupola Test No. 20 of Coke—Test 23. (July 7, 1905)
(Mines Nos. 51 and 79).

Charge (pounds)	Coke.	Pig Iron.	Scrap.
	190 (bed)	570	190
	60	420	140
	60	420	140
	60	420	140
	60	420	140
Total	430	2,250	750

Ratio, iron to coke	7
Analysis of coke (per cent.):	
Moisture	0.43
Volatile Matter	1.37
Fixed Carbon	97.20
Ash	4.00
Sulphur, in coke	0.84
Sulphur, in ash	0.02
Phosphorus	0.0018
Specific gravity	1.85
Fluidity strip (per cent.) full	99.4
Maximum blast pressure (ounces)	7
Record of melt:	
Pounds of iron, poured	2,143
Pounds of iron, addition melted	200
Total	2,343
Melting rate, per hour (pounds)	3,905

Recovered, iron (pounds)	383
Recovered, coke (pounds)	56
Melting loss (per cent.)	9.13
Melting ratio, iron to coke	6.26

Weight and time of each ladle of melted iron:

Blast on at	2:24 p. m.
Iron running	2:38 p. m.

	Lbs.:	At:		Lbs.:	At:
1	48	2:41	14	90	2:55
2	105	2:44	15	82	2:56
3	110	2:46	16	87	2:57
4	65	2:47	17	92	2:58
5	100	2:48	18	74	2:59
6	78	2:49	19	84	3:00
7	93	2:49½	20	75	3:02
8	79	2:50	21	78	3:03
9	57	2:50½	22	107	3:04
10	87	2:51	23	72	3:07
11	87	2:52	24	64	3:10
12	78	2:52½	25	92	3:12
13	93	2:53	26	64	3:13

Melting time (minutes) 36

Remarks: Iron very hot and fluid.

Loup Creek Colliery Co. Prospect—No. 330 on Map II.

On north hillside of Big Run, 1.1 miles east of Page; **Campbell Creek Coal**; elevation, 1840′±; examined by C. E. Krebs.

	Feet.	Inches.
Coal	3	8½

Loup Creek Colliery Co. Prospect—No. 331 on Map II.

On north hillside of Big Run, 1.8 miles S. 75° E. of Page; **Campbell Creek Coal**; elevation, 1910′±; examined by C. E. Krebs.

	Feet.	Inches.
Coal	4	5

Loup Creek Colliery Co. Prospect—No. 332 on Map II.

On north hillside of Big Run, 1.8 miles S. 76° E. of Page; **Campbell Creek Coal**; elevation, 1925′±; examined by C. E. Krebs.

	Feet.	Inches.
Coal	4	2

Loup Creek Colliery Co. Prospect—No. 333 on Map II.

On north side of Loup Creek, 1.8 miles S. 75° E. of Kincaid; **Campbell Creek Coal**; elevation, 2050′±; examined by C. E. Krebs.

	Feet.	Inches.
Coal	4	7

Loup Creek Colliery Co. Prospect—No. 334 on Map II.

On head of Open Fork of Loop Creek, 2.3 miles due east of Kincaid; **Campbell Creek Coal**; elevation, 2000'±; examined by C. E. Krebs.

	Feet.	Inches.
Coal	4	11

Loup Creek Colliery Co. Prospect—No. 335 on Map II.

On branch of Loop Creek, 1.2 miles S. 15° W. of Ford Knob; **Campbell Creek Coal**; elevation, 2090'±; examined by C. E. Krebs.

	Feet.	Inches.
Coal	3	8

Loup Creek Colliery Co. Prospect—No. 335A on Map II.

On head of branch of Hamilton Branch of Loop Creek, 1.3 miles S. 20° E. of Hamilton; **Campbell Creek (No. 2 Gas) Coal**; elevation, 2325'±; section by C. E. Krebs.

			Feet.	Inches.
Coal (slate roof)	1'	0"		
Slate	0	4		
Coal	3	3		
Slate	0	7		
Coal (slate floor)	3	0	8	2

Christian Colliery Co. No. 3 Mine—No. 336 on Map II.

On west hillside of Paint Creek, 0.7 mile south of Hickory Camp; **Campbell Creek (No. 2 Gas) Coal**; elevation, 1610' B.; examined by Teets and A. M. Hagan.

			Feet.	Inches.
1. Shale, hard, roof				
2. **Coal**, with local streaks of sulphur	3'	9"		
3. **Coal**, bony, (slate floor)	0	3	4	0

"Coal owned by Christian Colliery Company; principal office, Charleston, W. Va.; daily capacity, 60 tons; daily output, 60 tons; 4 laborers and 5 miners employed; electric haulage; shipped west for by-product purposes; butts S. 75° W.; faces, S. 15° E.; sample taken by A. M. Hagan from Nos. 2 and 3 of section, on main entry, 250 feet from drift; authority for mine data, R. B. Whitaker; started operation in 1918."

The analysis of this sample, as reported by Messrs. Hite and Krak, is given under **Mine No. 336** in Table 1 at the end of this Chapter.

Paint Creek Coal Mining Co. No. 3 Mine—
No. 336A on Map II.

On east side of Paint Creek, head of branch, 0.5 mile N. 70° E. of Hickory Camp; **Campbell Creek (No. 2 Gas) Coal**; elevation, 1550'± B.; examined and sampled by A. M. Hagan.

			Feet.	Inches.
1. Shale, blue, hard				
2. **Coal**, hard	1'	0"		
3. **Coal**, soft	1	6		
4. **Coal**, hard	1	6	4	0
5. Shale, blue, floor				

"Coal owned by Paint Creek Coal Mining Co.; principal office, Leader-News Bldg., Cleveland, Ohio; daily capacity, 800 tons; daily output, 100 tons; 8 laborers and 10 miners employed; mule haulage; motor haulage to be installed later; used for domestic fuel purposes; shipped west; greatest rise, east; sample No. 942H collected by A. M. Hagan in 1918 from Nos. 2, 3, and 4 of section, in main heading, about 80 feet from mouth; C. F. Cole, Superintendent; authority for mine data."

The composition of the above-mentioned sample, as reported by Messrs. Hite and Krak, is given under **Mine No. 336A** in Table 1 at the end of this Chapter.

Milburn Coal Co. Prospect Opening—No. 337 on Map II.

On point, 1.7 miles S. 70° W. of Keeferton; **Campbell Creek (No. 2 Gas) Coal**; elevation, 2050'± B.; section by R. B. Whitaker.

			Feet.	Inches.
Draw slate			0	4
Coal	3'	4"		
Rock	0	1		
Coal	0	11		
Slate	0	8		
Coal	1	6	6	6

Milburn Coal Co. Opening—No. 338 on Map II.

On head of Skitter Creek, 1.9 miles S. 30° W. of Keeferton; **Campbell Creek (No. 2 Gas Coal**; elevation, 2109' L.; section as reported by Milburn Coal Company to D. D. Teets, Jr.

			Feet.	Inches.
Coal, gas (slate roof)	3'	4"		
Rock	0	1		
Coal	0	11		
Slate	0	8		
Coal	1	6	6	6

The stratigraphic position of the coal at the above opening is exhibited in the Kingston--1.7 Miles West Section, page 165.

At **Prospect—No. 339 on Map II,** in edge of Raleigh County, 2¼ miles south of Kingston and 0.4 mile west of Town Creek Knob, the **Campbell Creek (No. 2 Gas) Coal** is reported at an elevation of 2345′ L., with a thickness of only 14 inches, according to data furnished by the Solvay Collieries Company.

Fayetteville District.

In Fayetteville District, the Campbell Creek Coal, including both the Peerless and No. 2 Gas divisions, is confined to a narrow belt along the western border and to another similar area in the southwest edge, as shown on Figure 13, page 499, and Map II. Both of these areas lie above drainage and are therefore accessible to drift openings. Its thickness and stratigraphic position are exhibited in the sections published in Chapter IV for Potato Hill Knob and Herberton, pages 191 and 193, respectively. It has been prospected considably by natives and the large land-holding companies, and it has been mined extensively on a commercial scale on the waters of Paint Creek. Its description at these openings will now be given.

Long Branch Coal Co. Prospect—No. 340 on Map II.

On southeast slope of Potato Hill Knob, 2.3 miles northwest of Herberton; **Campbell Creek (No. 2 Gas) Coal**; elevation, 2440′ B.; examined by the author.

						Feet.	Inches.
Coal prospect, **Peerless**, reported clean and hard gas coal by Wm. Bailey						3	0
Shale, buff and dark, argillaceous						15	0
Coal, soft, columnar			1′	8″			
Slate, dark-gray			0	1			
Coal, soft, columnar	0′	6″					
Coal, columnar, medium-hard	2	0					
Coal, soft, columnar	1	7	4	1			
Shale, gray			0	6	**No. 2**		
Coal, soft (slate, gray, floor)			0	4	**Gas**	6	8

Long Branch Coal Co. Mine—No. 55 on Map II.

On northeast slope of Potato Hill Knob, 2.5 miles northwest of Herberton; **Campbell Creek (No. 2 Gas) Coal**; elevation, 2435′ B.; examined by the author.

				Feet.	Inches.
1.	Dark shale roof				
2.	**Coal,** gas	3′	6″		
3.	Slate, 2″ to	0	0		
4.	**Coal,** soft, columnar	2	2	5	8
5.	Fire clay floor				

The above data were taken from page 407 of the Raleigh County Report of the Survey, by C. E. Krebs.

The above mine was visited in 1918 by Mr. A. M. Hagan, who collected a sample of the coal for analysis, and secured the following information:

				Feet.	Inches.
1.	Roof, slate				
2.	**Coal,** soft	0′	5″		
3.	**Coal,** bony	0	2		
4.	**Coal,** block	1	2		
5.	Slate, hard	0	1½		
6.	**Coal,** soft	0	6		
7.	**Coal,** with local partings	3	6	5	10½

"Coal owned by Long Branch Coal Company; principal office, Mt. Hope, W. Va.; daily capacity, 800 tons; daily output, 700 tons; 35 laborers and 100 miners employed; motor haulage; used for steam and by-product purposes; shipped to tidewater points; butts, N. 30° W.; faces N. 60° E.; greatest rise, northeast; sample No. 945H collected from Nos. 2, 3, 4, 6, and 7 of section for analysis; sample and section taken at rib of Main Entry, 2000′ from mouth of mine; authority for mine data, John Warren, Mine Foreman; started operation in 1914."

The analysis of this sample, as reported by Messrs. Hite and Krak, is given under **Mine No. 55** in Table 1 at the end of this Chapter.

The following information concerning this mine is taken from pages 408-409 of the Raleigh County Report of the Survey:

"The following are results of analyses made by the **Spring Coal** Company, 50 Congress Street, Boston, Mass., from samples taken from cars shipped to tidewater from the mines:

"Average analysis of seven cargoes shipped prior to July 1, 1913:

		Per cent.
Volatile Matter		28.97
Fixed Carbon		66.00
Ash		5.03
Total		100.00
Sulphur		0.68
B. T. U	14,801	

"Average analysis taken from three cargoes 2000 tons each, shipped October, 1913:

		Per cent.
Moisture		1.72
Fixed Carbon		67.01
Volatile Matter		27.24
Ash		4.03
Total		100.00
Sulphur		0.86
B. T. U (dry)	15,153	

Fusing temperature of ash, 2570° F.

Evaporation, 10.64 pounds water per pound of dry coal from and at 212° F.

"Analysis cargo per barge 'Dunlo' B/L January 13, 1914:

		Per cent.
Moisture		0.543
Volatile Matter		27.277
Fixed Carbon		67.450
Ash		4.730
Total		100.000
B. T. U. (dry basis)	15,380	

"Analysis of coal shipped by barge 'Carrie Clark' B/L April 24, 1914:

		Per cent.
Volatile Matter		29.73
Fixed Carbon		66.21
Ash		4.06
Total		100.00
Sulphur		0.80
B. T. U. (dry basis)	15,010	

"Analysis of coal shipped per Schr: 'Mary E. Palmer' B/L November 6, 1914, 2323 tons:

		Per cent.
Moisture		4.78
Volatile Matter		27.64
Fixed Carbon		62.69
Ash		4.89
Total		100.00
Sulphur		0.90
B. T. U. (dry basis)	14,757	

"Analysis of coal per barge 'J. B. Walker' B/L November 30, 1914, 3385 tons:

	Per cent.
Moisture	2.06
Volatile Matter	26.56
Fixed Carbon	65.78
Ash	5.60
Total	100.00
Sulphur (separately determined)	0.74
B. T. U. (dry)	14,798

Iron in ash as iron oxide (Fe_2O_3), 6.51 per cent.

"Coal ash tested in the form of a cone placed horizontally in a furnace with an oxidizing atmosphere began to bend at 2700° F., and was completely bent at 2765° F.

"The coal is very friable and mines easily; the slate roof is generally good and the fire clay floor hard and smooth, which makes it an ideal pick mining coal."

The foregoing analyses and calorific tests are very interesting, in that they show a coal of remarkable purity and high heating value, possessing almost as many British Thermal Units per pound of coal as the famous New River and Pocahontas beds of West Virginia. It carries here almost a thousand British Thermal Units per pound more than in the Montgomery region of Fayette, a feature that shows the tendency of the coal beds to lose their volatile constituents as the mountainous region of the State is approached as a direct result of metamorphic action. This causes a corresponding increase in the fixed carbon content and its calorific value, a feature in connection with the coals of the Kanawha Group that apparently takes place in Fayette where the beds of the latter group overlap the minable areas of the coals of the New River Group.

Willis Branch Coal Co. Mine—No. 56 on Map II.

On head of Willis Branch, 1.2 miles due west of Herberton; Campbell Creek (No. 2 Gas) Coal; elevation, 2676' L.

			Feet.	Inches.
Coal, gas	1'	3"		
Slate, 1" to	0	0		
Coal	0	2		
Slate	0	2		
Coal, gas, columnar	4	6	6	1

The above section is as measured by Mr. C. E. Krebs, formerly an Assistant Geologist of the Survey, as published on page 409 of the Raleigh County Report, and the coal erroneously correlated by him with the Alma bed, as will appear from an examination of the Herberton Section, page 193, and the introductory remarks in connection therewith.

The following section of the coal at this mine was measured by the author:

				Feet.	Inches.
Shale, argillaceous, visible				4	0
Coal, soft, columnar	0′	7″			
Slate, dark-gray, lenticular, 0″ to	0	0½			
Coal, soft, columnar	0	10½			
Slate, dark-gray, ½″ to	0	1			
Coal, soft, columnar, 2″ to	0	3			
Slate, dark-gray	0	2			
Coal, soft, columnar	4	0			
Slate, gray, 1″ to	0	2			
Coal, soft, columnar, 4″ to	0	6	No. 2 Gas	6	8

"Coal owned by McKinley Land Company, of Lewisburg, W. Va.; John B. Laing, President; Thomas Laing, Vice-President; shipped east to New England States for steam, and sell Virginian Railway Company 50 to 60 car-loads monthly for fuel steam; coal is exceptionally good for by-product purposes; average daily output, 400 long tons, 9-hour day; men employed, 60 inside, and 15 outside."

The above information was secured by the writer in 1916. Later information was secured by Mr. A. M. Hagan in 1918 when he visited the mine to sample the coal for analysis, as follows:

					Feet.	Inches.
1.	Roof, slate					
2.	Coal, gas	0′	8″			
3.	Slate	0	0½			
4.	Coal, good	1	0			
5.	Slate	0	2			
6.	Coal	0	3			
7.	Slate	0	5			
8.	Coal, good	4	0			
9.	Slate	0	1			
10.	Coal	0	5	...	7	2½

"Nos. 5, 6, and 7 of above section are not mined; daily capacity, 900 tons; daily output, 800 tons; coal owned by Willis Branch Coal Company; principal office, Willis Branch, W. Va.; 40 laborers and 100 miners employed; motor haulage; used for by-product purposes and steam fuel; shipped east; greatest rise, S. 52° E.; sample No. 944H collected by A. M. Hagan from Nos. 2, 4, 6, 8, and 10 for analysis; sample taken and section measured in Room 25, Main 5 Entry, 1500 feet in; authority for mine data, T. K. Laing, General Manager; operation started in 1915."

The analysis of this sample, as reported by Messrs. Hite and Krak, is given under **Mine No. 56** in Table 1 at the end of this Chapter.

Mountain Cove District.

In Mountain Cove District, the Campbell Creek Coal, including both the Peerless and No. 2 Gas members, is confined to the northwest portion, high up on the slopes of Gauley Mountain, and its intimately associated spurs, as shown in detail on Figure 13, page 499, and on Map II. Its thickness and stratigraphic position are exhibited in the sections published in Chapter IV for Ansted and Mulvane—1 Mile Southwest, pages 171 and 173, respectively. It has been prospected considerably and mined extensively on a commercial scale on the waters of Mill Creek. Its description at these openings and other exposures will now be given.

Gauley Mountain Coal Co. Mine—No. 52 on Map II.

On Mill Creek waters, 1.0 mile N. 20° W. of Ansted; **Campbell Creek (No. 2 Gas) Coal**; elevation, 1729′ L.; section measured at south end of tunnel through to head of Rich Creek, by the author.

				Feet.	Inches.
1.	**Coal**, gas, reported, 1′ 6″ to...	2′	0 ″		
2.	Shale, gray....................	0	10		
3.	**Coal**, gas......................	0	2		
4.	Shale, gray....................	0	2		
5.	**Coal**, soft, columnar...........	1	9		
6.	Slate, gray....................	0	0½		
7.	**Coal**, columnar, hard..........	1	10½		
8.	Slate, gray....................	0	4		
9.	**Coal**, columnar, block, softer...	1	2		
10.	Slate, gray, soft...............	0	5		
11.	**Coal**	0	8		
12.	**Bone**	0	1		
13.	**Coal**, columnar, hard, (slate floor)	1	7	11	1

"The west end of this tunnel, driven on No. 2 Gas Coal, is 57 feet lower, according to R. C. Taylor, General Manager. On Rich Creek, Mr. Taylor reports that parting No. 8 expands to 40 feet and only that portion above it is mined on Rich Creek. At Jodie both and mined. Principal office, Ansted, W. Va.; used for domestic, gas and steam purposes; coal owned by Company; number of men employed, 125 miners, 110 laborers, and 40 coke workers; capacity, 1000 tons daily; output, 600 tons daily; electric haulage; coke output, 175 tons daily; 152 beehive coke ovens, old type; R. C. Taylor, Superintendent, authority for mine data."

The following section at this mine was measured by R. W. Edmonds as published by Dr. White on pages 574-5 of Volume II:

			Feet.	Inches.
Coal	1′	8″		
Slate	2	0		
Draw slate	0	6		
Coal	1	6		
Slate and coal	0	6		
Coal	3	5	9	7

"Butts, N. 45° W.; faces, N. 45° E.; greatest rise, S. 25° E.

"The uppermost bench of this coal appears to represent the 'Peerless' member of the Campbell Creek bed, with the slate interval thinned down to only two feet. When this interval is thin, the coal is taken out, but when it thickens, (as it does to several feet in many portions of the Gauley Mountain Company's mine), this portion of the bed is then abandoned."

The analysis of a sample of the coal from this mine, collected by Mr. Edmonds and analyzed by Prof. Hite, as published by Dr. White on page 575 of Volume II and republished by him under No. 9 on page 276 of Bulletin 2, is given under **Mine No. 52** in Table 1.

Mr. Edmonds also collected a sample of the coke made at this mine, the analysis of same being made by Prof. Hite and published by Dr. White, under No. 7 on page 574 of Volume II and republished by him under the same number on page 366 of Volume II(A) and pages 263-4 of Bulletin 2 of the Survey. This analysis is given under **No. 52** in Table 2 at the end of this Chapter.

Two sections at the above mine were measured and sampled by J. S. Burrows of the U. S. Geological Survey in 1904, as given on page 907 of Bulletin 22, Part II, of the U. S. Bureau of Mines, Section A (sample 1257) being measured in room 27, off entry 9, while Section B (sample 1258) was measured in room 15, off entry 15. The analyses of these samples are given under **Mine No. 52** in Table 3 at the end of this Chapter, as also the analysis of Sample No. 1515, which was taken from 35 tons of run-of-mine coal. At the point where sample No. 1257 was taken, the bed had a thickness of 53¼ inches, 48¼ inches being the section cut for sample, while at 1258 the thickness was 52¼ inches and 51¾-inch cut. These analyses were published on page 223 of the Bulletin above cited, where the reader will also find calculations of same on "moisture free" and "moisture and ash free" bases. The analyses as given in the table in this volume referred to were also published by the U. S. Geological Survey on page 56 of Bulletin 261 in 1905.

For results of tests of this coal, see mention of specific tests as follows: steaming tests: U. S. Geol. Survey Prof. Paper 48, pp. 881-8, Bull. 261, p. 82; Bureau of Mines Bull. 23, p. 69; producer-gas tests: U. S. Geol. Survey Prof. Paper 48, p. 1258; Bureau of Mines Bull. 13, pp. 216, 276; coking tests: U. S. Geol. Survey Prof. Paper 48, p. 1362; Bull. 261 pp. 128, 132; cupola tests of coke: U. S. Geol. Survey Prof. Paper 48, p. 1385, which are given on the following pages:

Test No. 53—Regular and special observations on test of West Virginia No. 8 coal, November 11, 1904.

REGULAR.

(Duration of trial, 9.983 hours).

Time	Steam Pressure Gage	Temperatures			Calorimeter		Draft Pressures		Flue Gases		
		Outside	Boiler Room	Flue Gases, Base of Stack	Steam Discharge	Water Separated in 10 Minutes	In Hood, in Inches of Water	In Furnace, in Inches of Water	CO₂	O₂	CO
	Lbs.	°F.	°F.	°F.	Lbs.	Lbs.			P.C.	P.C.	P.C.
7:40	82	......	54	505	......	......	0.54	0.08	......	......	....
8:00	80	36	55	570	......	......	.62	.18	......	......	....
8:20	83	37	55	555	......	......	.50	.17	......	......	....
8:40	80	38	55	525	4.02	0.02	.47	.17	7.6	11.5	0.0
9:00	74	39	57	530	......	......	.03	.02	......	......	....
9:20	85	39	57	545	......	......	.26	.10	......	......	....
9:40	80	40	57	540	4.0	.021	.42	.11	9.2	10.2	.0
10:00	86	40	58	551	......	......	.33	.13	......	......	....
10:20	84	40	59	530	......	......	.46	.18	......	......	....
10:40	86	41	60	515	4.29	.025	.24	.15	9.6	9.8	.0
11:00	84	42	58	525	......	......	.40	.13	......	......	....
11:20	85	42	59	550	......	......	.44	.17	......	......	....
11:40	83	43	60	520	4.2	.015	.37	.15	9.4	9.4	.3
12:00	83	43	60	520	......	......	.31	.13	......	......	....
12:20	83	43	61	525	......	......	.28	.11	......	......	....
12:40	82	43	62	518	4.08	.01	.30	.12	10.0	9.2	.4
1:00	80	44	62	515	......	......	.39	.11	......	......	....
1:20	85	43	61	550	......	......	.34	.11	......	......	....
1:40	83	43	62	540	4.1	.015	.29	.08	9.6	9.8	.1
2:00	83	44	63	570	......	......	.43	.11	......	......	....
2:20	82	44	63	550	......	......	.28	.08	......	......	....
2:40	82	44	63	560	4.18	.015	.40	.12	8.8	10.8	.1
3:00	84	41	63	565	......	......	.35	.11	......	......	....
3:20	80	44	63	520	......	......	.16	.06	......	......	....
3:40	84	44	62	566	4.26	.02	.35	.10	8.0	11.9	.0
4:00	84	44	62	530	......	......	.42	.15	......	......	....
4:20	82	44	62	526	......	......	.28	.10	......	......	....
4:40	84	42	61	545	4.24	.018	.46	.16	7.9	11.9	.0
5:00	81	42	62	545	......	......	.35	.13	......	......	....
5:20	77	42	60	500	......	......	.60	.13	......	......	....
5:40	82			......	......	......	......	......	7.4	12.6	.0
Total	[illegible]	1,313	1,788	16,246	37.37	.159	11.07	3.55	87.5	107.1	.9
Average ..	[illegible]	44	59.6	541	4.15	.0177	.369	.118	8.75	10.71	.09

Test No. 53—Regular and special observations on test of West Virginia No. 8 coal, November 11, 1904.

Continued.

SPECIAL.

Time.	Height of water.		Weight of coal burned		Weight of water fed to boiler	
	In tank.	In gage glass.	During period.	Total.	During period.	Total.
	Inches.	Inches.	Pounds.	Pounds.	Pounds.	Pounds.
Start, 7:36	40	3½	....	....	....	....
8:03	16½	1¼	700	700	2,713	2,713
8:35	14	2	700	1,400	3,774	6,487
9:32	37½	3¼	700	2,100	6,427	12,914
10:23	42½	3½	700	2,800	5,324	18,238
11:11	40	3	700	3,500	5,391	23,629
12:03	38½	3	700	4,200	5,161	28,790
12:56	42¼	4½	700	4,900	4,970	33,760
1:54	34	5	700	5,600	6,024	39,784
2:54	42	4½	700	6,300	6,037	45,821
3:50	35½	3	700	7,000	5,970	51,791
5:04	35½	3¾	700	7,700	6,717	58,508
Close, 5:35	35	3½	297	7,997	2,439	60,947

Record of Furnace Conditions.

Time	Observation.	Time	Observation.
	Boiler under a load during night.	11:59	Fire sliced, 12 inches thick.
7:00	Fired cleaned.	12:21	Fire raked, 12 inches thick.
7:36	Test started, fire 3 inches thick.	12:45	Fire sliced; some clinkers taken out.
7:53	Fire raked, 8 inches thick.	1:11	Fire raked, 10 inches thick.
8:47	Fire raked, 10 inches thick.	1:31	Fire raked, 10 inches thick.
9:00	Furnace door opened for 5 minutes.	2:08	Fire raked, 10 inches thick.
	Injector not working.	2:23	Fire raked, 10 inches thick.
9:28	Fire raked, 10 inches thick.	3:09	Fire sliced.
9:53	Fire raked, 10 inches thick.	3:45	Fire raked, 10 inches thick.
10:12	Fire raked, 10 inches thick.	4:14	Fire raked, 12 inches thick.
10:48	Fire raked, 12 inches thick.	4:42	Fire raked, 10 inches thick.
10:52	Fire sliced.	4:53	Cleaning fire.
11:21	Fire raked, 12 inches thick.	5:08	Fire cleaned, 3 inches thick.
11:40	Fire raked, 12 inches thick.	5:35	Test closed, fire 3 inches thick.

Ash white, fine, and light. Clinkers light gray. Coal burned very freely, with long flame; coked a little; fire easily handled. 100 firings during test.

Steam test of West Virginia No. 8 Coal.

CONDITIONS OF BOILER TRIAL.

Test number, 53.
Made by boiler division, United States Geological Survey.
At fuel-testing plant, Louisiana Purchase Exposition, St. Louis, Mo.
Kind of boiler, Heine safety.
To determine the economy of coal as a fuel.
Principal conditions governing trial, see general report. Steam jets not operated. Hughes apparatus operated.
Kind of fuel, West Virginia No. 8.
Kind of furnace, hand fired.
State of the weather, cloudy.
Method of starting and stopping the test. Alternate.
Number of boiler (plant number), 2.
Type of boiler, water tube.
1. Date of trial, November 11, 1904.
2. Duration of trial..................................hours 9.983

DIMENSIONS AND PROPORTIONS.

3.	Grate surface	square feet	40.55
3.1	Width of grate	feet	6.16
3.2	Length of grate	feet	6.58
4.	Height of furnace	inches	26
5.	Approximate width of air spaces in grate	inches	.5
6	Proportion of air surface to whole grate surface	per cent.	44
6.1	Area of chimney	square feet	7.67
6.2	Height of chimney above grate	feet	113.25
6.3	Length of flue connecting to chimney	feet	None.
6.4	Kind of draft		Natural.
7.	Water-heating surface	square feet	2,031
7.1	Outside diameter of shell	inches	42.94
7.2	Length of shell (outside to outside of heads)	feet	21.58
7.3	Number of tubes		116
7.4	Diameter of tubes (outside-inside)	inches inches	3.5 3.26
7.5	Length of tubes exposed	feet	17.87
8.	Superheating surface	square feet	None.
9.	Ratio of water-heating surface to grate surface		50.1:1
10.	Ratio of minimum draft area to grate surface		1:9.1

AVERAGE PRESSURES.

11.	Barometer	inches of mercury pounds	29.88 14.67
11.1	Steam pressure by gage per square inch	pounds pounds	82.2 [*]96.87
12.	Force of draft between damper and boiler, inches of water		.37
13.	Force of draft in furnace	inches of water	.12
14.	Force of draft or blast in ash pit	inches of water	0

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[*] Absolute.

AVERAGE TEMPERATURES.

15.	Of external air	degrees	42.
16.	Of fireroom	degrees	60.
17.	Of steam	degrees	325.3
18.	Of feed water in tank	degrees	54.8
19.	Of feed water entering economizer	degrees	....
20.	Of feed water entering boiler	degrees	193
21.	Of escaping gases from boiler	degrees	541
22.	Of escaping gases from economizer	degrees	....
22.1	Of furnace	degrees	....

FUEL.

23.	Size and condition: Nut—small, 50 per cent.; slack, 50 per cent.; bright.		
24.	Weight of wood used in lighting fire	pounds	None.
25.	Weight of coal as fired	pounds	7,997
26.	Percentage of moisture in coal		5.26
27.	Total weight of dry coal consumed	pounds	7,576
28.	Total ash and refuse	pounds	754
29.	Quality of ash and refuse: Clinker	per cent.	44
30.	Total combustible consumed	pounds pounds	6,822 [*]6,849
31.	Percentage of ash and refuse in dry coal		9.95

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[*] Calculated from chemistry of ash.

PROXIMATE ANALYSIS OF COAL.

		Per cent. of coal.	Per cent. of combustible.
32.	Fixed carbon	56.68	64.5
33.	Volatile matter	31.19	35.5
34.	Moisture	5.26	......
35.	Ash	6.87	......
		100.00	100.00
36.	Sulphur, separately determined	0.74	......

ULTIMATE ANALYSIS OF DRY COAL.

37.	Carbon (C)	80.37	86.65
38.	Hydrogen (H)	5.08	5.48
39.	Oxygen (O)	5.12	5.52
40.	Nitrogen (N)	1.40	1.51
41.	Sulphur (S)	.78	.84
42.	Ash	7.25	......
		100.00	100.00
43.	Moisture in sample of coal as received	5.26	......

ANALYSIS OF ASH AND REFUSE.

44.	Carbon	per cent.	23.64
45.	Earthy matter	per cent.	76.36

FUEL PER HOUR.

46.	Dry coal consumed per hour	pounds	759
47.	Combustible consumed per hour	pounds pounds	683 [a]686
48.	Dry coal per square foot of grate surface per hour	pounds	18.72
49.	Combustible per square foot of water-heating surface per hour	pounds pounds	.336 [a].338

CALORIFIC VALUE OF FUEL.

50.	Calorific value by oxygen calorimeter per pound of dry coal, B. T. U.	14,436
51.	Calorific value by oxygen calorimeter per pound of combustible, B. T. U.	15,564
52.	Calorific value by analysis per pound of dry coal, B. T. U.	14,474
53.	Calorific value by analysis per pound of combustible, B. T. U.	15,605

QUALITY OF STEAM.

54.	Percentage of moisture in steam		.424
55.	Number of degrees of superheating		None.
56.	Quality of steam (dry steam=unity)	per cent.	99.68

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[a] Calculated from chemistry of ash.

WATER.

57.	Total weight of water fed to boiler	pounds	60,947
58.	Equivalent water fed to boiler from and at 212°	do.	73,100
59.	Water actually evaporated, corrected for quality of steam	do.	60,752
60.	Factor of evaporation		1.1994
61.	Equivalent water evaporated into dry steam from and at 212°	pounds	72,866

WATER PER HOUR.

62.	Water evaporated per hour, corrected for quality of steam	pounds	6,086
63.	Equivalent evaporation per hour from and at 212°	do.	7,299
64.	Equivalent evaporation per hour from and at 212° per square foot of water-heating surface	pounds	3.59

HORSE-POWER.

65.	Horse-power developed (34½ pounds of water evaporated per hour into dry steam from and at 212°=1 horse-power)	211.56
66.	Builders' rated horse-power	210
67.	Percentage of builders' rated horse-power developed	100.74

ECONOMIC RESULTS.

68.	Water apparently evaporated under conditions per pound of coal as fired. (Item 57÷item 25)	pounds	7.62
69.	Equivalent evaporation from and at 212° per pound of coal as fired. (Item 61÷item 25)	pounds	9.11
70.	Equivalent evaporation from and at 212° per pound of dry coal. (Item 61÷item 27)	pounds	9.62
71.	Equivalent evaporation from and at 212° per pound of combustible (Item 61÷item 30)	do. do.	10.68 [a]10.64

EFFICIENCY.

72.	Efficiency of the boiler (heat absorbed by the boiler per pound of combustible divided by the heat value of 1 pound of combustible	per cent. do.	66.27 [a]66.02
73.	Efficiency of boiler, including the grate (heat absorbed by the boiler per pound of dry coal divided by the heat value of 1 pound of dry coal)	per cent.	64.35

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[a] Calculated from chemistry of ash.

•COST OF EVAPORATION.

74.	Cost of coal per ton of 2,000 pounds delivered in boiler room (assumed)		$1.00
75.	Cost of fuel for evaporating 1,000 pounds of water under observed conditions		$0.0656
76.	Cost of fuel used for evaporating 1,000 pounds of water from and at 212°		$0.0549

SMOKE OBSERVATIONS.

77.	Percentage of smoke as observed		46.2
78.	Weight of soot per hour obtained from smoke meter	ounces	....
79.	Volume of soot per hour obtained from smoke meter	cubic inches	....

METHODS OF FIRING.

80.	Kind of firing (spreading, alternate, or coking)		Alternate.
81.	Average thickness of fire	inches	10–12
82.	Average intervals between firing for each furnace during time when fires are in normal condition	minutes	6
83.	Average intervals between times of leveling or breaking up	do.	30

ANALYSIS OF THE DRY GASES.

84.	Carbon dioxide (CO_2)	per cent.	8.75
85.	Oxygen (O)	do.	10.71
86.	Carbon monoxide (CO)	do.	.09
87.	Hydrogen and hydrocarbons	do.	.....
88.	Nitrogen (by difference) (N)	do.	80.45

HEAT BALANCE, OR DISTRIBUTION OF THE HEATING VALUE OF THE COMBUSTIBLE.

Total heat value of 1 pound of combustible, B. T. U. 15,564

		B. T. U.	Per cent.
1.	Heat absorbed by the boiler=evaporation from and at 212° per pound of combustible × 965.7	10,275	[a]66.02
2.	Loss due to moisture in coal=per cent. of moisture referred to combustible ÷ 100× [(212–t)+966+0.48 (T–212)] (t=temperature of air in the boiler room; T=that of the flue gases)	76	.49
3.	Loss due to moisture formed by the burning of hydrogen=per cent. of hydrogen to combustible÷100×9×[(212–t)+966+0.48(T-212]	629	4.04
4.	Loss due to heat carried away in the dry chimney gases=weight of gas per pound of combustible×0.24×(T-t)	2,813	18.08

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[a] Calculated from chemistry of ash.

	B. T. U.	Per cent.
5. Loss due to incomplete combustion of carbon= $\frac{CO}{CO_2+CO}\times\frac{\text{per cent. C in combustible}}{100}\times 10{,}150$..	90	.58
6. Loss due to unconsumed hydrogen and hydrocarbons, to heating the moisture in the air, to radiation, and unaccounted for. (Some of these losses may be separately itemized if data are obtained from which they may be calculated)	1,681	10.79
		100.00

REMARKS.

Dry coal per indicated horse-power hour = 2.94 pounds.
Dry coal per electrical horse-power hour = 3.63 pounds.

GENERAL RESULTS.

Lot of producer-gas test No. 19, West Virginia No. 8 coal, January 20, 21, 1905.

(Coal from mine of the Gauley Mountain Coal Company, Ansted, W. Va.)

Time.	Coal consumed by producer (pounds).	Gas meter (cubic feet).	Temperature of gas (°F.).	Water meter (cubic feet).	Manometers at gas meter (inches water).		Auxiliary motors. Watt meter.	Speed counts load on gas engine.	Volts.	Amperes.	Temperature of gas leaving producer (°C.).	Manometers at producer.		Gas calorimeter.						
														Temperatures (°C.).			Cubic centimeters of water collected.	Cubic feet of gas.	B. T. U.	
														Gas.	Water.					
					1	2						Air entering (inches mercury).	Gas leaving (inches water).		Inlet.	Outlet.			As read.	Standardized.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
8:40 a. m.[a]	300	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
9:40 a. m.	....	9,397,250	54	....	2.1	-0.6	906,710	0,000	240	624	540	0.6	5.0	....	....	....	....	....	....	....
10:00 a. m.	300	9,404,580	58	....	2.1	-0.2	....	2,027	239	629	480	....	....	22.0	5.0	13.6	880	0.2	150.0	155.2
10:20 a. m.	....	9,411,100	63	....	2.2	+.6	....	4,058	239	639	500	.6	5.0	23.0	5.0	14.6	810	.2	154.0	159.5
10:40 a. m.	....	9,417.300	64	....	2.3	.8	908,530	9,090	238	629	470	....	....	25.0	5.0	14.6	800	.2	152.4	159.1
11:00 a. m.	300	9,423,750	67	....	2.2	.6	....	8,114	239	624	500	.6	5.0	27.5	5.0	14.3	840	.2	154.7	162.8
11:20 a. m.	....	9,430,480	68	....	2.1	.2	....	10,137	239	629	510	....	....	30.0	5.1	14.6	870	.2	163.8	173.9
11:40 a. m.	....	9,437,320	69	....	2.2	.6	910,400	12,158	238	624	500	....	....	29.0	5.0	14.4	820	.2	152.8	161.8
12 m.	300	9,444,000	69	....	2.2	.4	....	14,185	239	619	500	.8	6.0	29.0	5.0	14.5	880	.2	161.1	170.6
12:20 p. m.	....	9,450,830	70	....	2.1	.2	....	16,198	238	629	490	....	....	....	....	....	....	....	....	....
12:40 p. m.	....	9,457,900	71	....	2.1	—.2	912,370	18,215	236	629	430	....	....	25.0	5.0	13.2	940	.2	152.8	159.5
1:00 p. m.	....	9,465,200	70	....	2.1	—.4	....	20,210	238	624	510	....	....	24.0	5.0	12.9	940	.2	147.1	152.8
1:20 p. m.	....	9,472,450	70	....	2.1	—.4	....	22,220	238	614	520	.8	7.0	23.5	5.0	12.8	980	.2	143.6	149.1
1:40 p. m.	300	9,479,800	70	....	2.1	—.2	914,100	24,213	242	614	450	....	....	22.0	4.8	12.8	920	.2	144.4	149.4
2:00 p. m.	....	9,486,750	70	....	2.1	+.5	....	26,233	244	611	400	....	....	21.5	4.8	13.7	920	.2	162.3	167.7
2:20 p. m.	300	9,493,250	70	....	2.2	.8	....	28,256	240	624	410	....	....	21.0	4.8	14.9	760	.2	153.0	158.0
2:40 p. m.	....	9,499,600	70	....	2.3	.8	916,130	30 288	240	624	430	.5	5.0	20.5	4.8	14.9	770	.2	156.0	160.4
3:00 p. m.	300	9,506,000	69	....	2.3	.8	....	32,313	238	629	380	....	....	20.0	4.8	14.7	800	.2	157.1	161.8
3:20 p. m.	....	9,512,650	69	....	2.3	.4	....	34,330	240	619	510	....	....	21.0	4.8	13.4	870	.2	148.4	152.8
3:40 p. m.	....	9,519,350	70	....	2.3	.5	918,000	36,347	242	619	490	....	....	20.8	4.8	14.4	790	.2	150.0	154.3
4:00 p. m.	....	9,525,980	71	....	2.2	.4	....	38,372	241	619	400	....	....	20.5	4.8	14.0	830	.2	143.2	147.3
4:10 p. m.	300	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
4:20 p. m.	....	9,532,660	71	....	2.2	.4	....	40,393	241	614	....	....	....	20.5	4.8	14.4	800	.2	152.4	156.8
4:40 p. m.	....	9,539,300	71	....	2.3	.4	919,800	42,416	240	619	500	....	....	20.5	4.8	14.7	770	.2	143.2	147.3
5:00 p. m.	....	9,545,540	70	....	2.3	.6	....	44,440	241	614	480	....	....	20.5	4.8	14.7	800	.2	157.1	161.6
5:15 p. m.	300	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....

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[a] January 20, average barometer for entire test, 29.58 inches.

Log of producer-gas test No. 19, West Virginia No. 8 coal, January 20, 21, 1905—Continued.

(Coal from mine of the Gauley Mountain Coal Company, Ansted, W. Va.)

Time.	Coal consumed by producer (pounds).	Gas meter (cubic feet).	Temperature of gas (°F.).	Water meter (cubic feet).	Manometers at gas meter (inches water)		Auxiliary motors. Watt meter	Speed counters on gas engine.	Load.		Temperature of gas leaving producer (°C.)	Manometers at producer.		Gas calorimeter.						
														Temperatures (°C.).					B. T. U.	
															Water.					
					1	2			Volts.	Amperes		Air entering (inches mercury).	Gas leaving (inches water).	Gas.	Inlet.	Outlet.	Cubic centimeters of water collected.	Cubic feet of gas.	As read.	Standardized.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
5:20 p. m.	....	9,551,620	70	....	2.3	.6	....	46,464	240	624	440	....	....	18.0	4.7	13.9	780	.2	142.1	144.8
5:40 p. m.	....	9,557,530	69	....	2.3	.8	921,590	48,488	241	624	450	....	....	18.5	4.7	14.7	790	.2	156.7	159.8
6:00 p. m.	....	9,563,330	69	....	2.3	.6	....	50,515	240	634	390	....	....	19.0	4.7	14.8	790	.2	158.3	162.0
6:15 p. m.	300	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	.....	....	......	.....
6:20 p. m.	....	9,569,140	69	....	2.3	.6	....	52,542	241	624	400	....	....	....	....	....	.....	....	......	.....
6:40 p. m.	....	9,575,910	69	....	2.3	.6	923.400	54,569	241	624	460	0.6	5.0	....	....	....	.....	....	......	.....
7:00 p. m.	....	9,580,700	68	....	2.3	.6	....	56,599	240	619	480	....	....	16.5	4.7	13.9	850	.2	155.1	157.3
7:15 p. m.	300	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	.....	....	......	.....
7:20 p. m.	....	9,586,500	68	....	2.3	1.0	....	58,618	243	575	410	....	....	17.5	4.8	14.3	800	.2	150.7	153.3
7:40 p. m.	....	9,592,750	68	....	2.3	.6	925,150	60,634	239	624	480	....	....	16.0	4.7	12.8	840	.2	134.9	136.6
8:00 p. m.	300	9,599,200	68	....	2.3	.6	....	62,645	240	624	450	....	....	17.8	4.8	13.4	870	.2	148.4	151.2
8:20 p. m.	....	9,605,550	68	....	2.3	.6	....	64,653	240	624	520	.6	5.0	17.0	4.8	13.1	940	.2	154.7	157.2
8:30 p. m.	300	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	.....	....	......	.....
8:40 p. m.	....	9,612,100	68	....	2.3	.6	927,000	66,666	240	619	400	....	....	17.0	4.8	14.1	830	.2	152.8	155.4
8:45 p. m.	300	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	.....	....	......	.....
9:00 p. m.	....	9,618,450	69	....	2.3	.8	....	68,684	240	624	....	.6	5.0	17.0	4.8	14.2	860	.2	160.3	163.1
9:20 p. m.	....	9,624,850	69	....	2.3	.8	....	70,703	241	594	470	....	....	16.3	4.8	13.3	880	.2	148.4	150.3
9:30 p. m.	300	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	.....	....	......	.....
9:40 p. m.	....	9,631,250	69	....	2.3	.8	....	72,720	238	644	410	....	....	16.0	4.6	12.4	930	.2	143.6	146.2
10:00 p. m.	....	9,637,720	69	....	2.3	.8	....	74,745	240	624	460	....	....	17.0	4.7	12.8	930	.2	149.2	151.7
10:15 p. m.	300	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	.....	....	......	.....
10:20 p. m.	....	9,644,200	70	....	2.3	.6	....	76,755	238	659	410	....	....	16.5	4.7	12.4	1,000	.2	152.8	154.8
10:40 p. m.	....	9,650,800	70	....	2.3	.6	930,500	78,766	240	634	450	....	....	16.5	4.7	12.7	1,000	.2	158.7	160.8
11:00 p. m.	300	9,657,200	70	....	2.3	0.6	....	80,782	240	624	480	....	....	....	....	....	.....	....	......	.....
11:05 p. m.	....	....	....	....	....	....	....	....	....	....	....	....	....	17.0	4.8	12.0	970	.2	155.9	158.3
11:20 p. m.	....	9,663,500	70	....	2.3	.7	....	82,811	240	624	460	.6	5.5	17.0	4.7	13.2	1,000	.2	168.6	171.2
11:40 p. m.	....	9,669,600	70	....	2.3	.8	932.200	84,828	239	634	440	....	....	17.0	4.7	12.7	1,050	.2	166.6	170.9
11:45 p. m.	300	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	.....	....	......	.....
12:00 p. m.	....	9,675,510	70	....	2.4	.8	....	86,853	241	629	420	....	....	18.0	4.8	13.5	920	.2	158.7	161.9

Log of producer-gas test No. 19, West Virginia No. 8 coal, January 20, 21, 1905.—Continued.

(Coal from mine of the Gauley Mountain Coal Company, Ansted, W. Va.)

Time.	Coal consumed by producer (pounds).	Gas meter (cubic feet).	Temperature of gas (°F.).	Water meter (cubic feet).	Manometers at gas meter (inches water)		Auxiliary motors. Watt meter	Speed counters on gas engine.	Load.		Temperature of gas leaving producer (°C.)	Manometers at producer.		Gas calorimeter.						
					1	2			Volts.	Amperes		Air entering (inches mercury).	Gas leaving (inches water).	Temperatures (°C.).			Cubic centimeters of water collected.	Cubis feet of gas.	B. T. U.	
														Gas.	Water.				As read.	Standardized.
															Inlet.	Outlet.				
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
12:20 a. m.[a]	....	9,681,340	70	....	2.4	.8	....	88,876	241	614	480	.6	5.0	18.0	4.8	15.0	760	.2	153.9	157.1
12:30 a. m.	300	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	.....	....	.....	.....
12:40 a. m.	....	9,687,300	70	....	2.4	.7	934,050	90,896	241	619	450	....	....	18.0	4.8	14.8	750	.2	148.8	151.8
1:00 a. m.	....	9,693,210	70	....	2.3	.7	....	92,919	239	634	460	....	....	19.0	4.8	15.3	770	.2	160.3	164.2
1:15 a. m.	300	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	.....	....	.....	.....
1:20 a. m.	....	9,699,350	70	....	2.4	.7	....	94,037	239	624	420	.6	4.5	18.0	4.8	15.2	720	.2	148.4	151.5
1:40 a. m.	....	9,705,340	70	....	2.3	.9	935,840	96,959	241	614	440	....	....	18.0	4.8	15.6	690	.2	148.0	151.0
2:00 a. m.	300	9,711 300	70	....	2.4	.8	....	98,982	240	624	450	.7	5.0	18.0	4.8	15.0	730	.2	147.6	150.6
2:20 a. m.	....	9,717,360	70	....	2.3	.7	....	101,002	240	619	420	....	....	17.5	4.8	15.0	730	.2	147.6	150.2
2:40 a. m.	....	9,723,410	70	....	2.3	.8	937,540	103,024	241	585	500	....	....	18.0	4.7	15.1	700	.2	144.4	147.2
3:00 a. m.	300	9,729,190	70	....	2.4	.9	....	105,049	243	565	480	.5	4.0	17.5	4.8	15.4	700	.2	147.2	149.8
3:20 a. m.	....	9,734,040	70	....	2.3	.3	....	107,071	239	634	450	....	....	17.5	4.8	13.2	850	.2	141.7	144.2
3:40 a. m.	....	9,741,670	69	....	2.3	.6	939,220	109,070	241	629	510	....	....	17.5	4.8	13.2	850	.2	144.8	147.5
4:00 a. m.	....	9,748,000	69	....	2.4	.8	....	111,092	242	609	530	....	....	17.5	4.8	14.6	740	.2	143.6	146.1
4:15 a. m.	300	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	.....	....	.....	.....
4:20 a. m.	....	9,754,220	70	....	2.3	.6	....	113,115	240	629	500	....	....	18.0	4.8	14.4	760	.2	144.8	147.4
4:40 a. m.	....	9 760,400	69	....	2.3	.8	940,920	115,136	240	614	520	.6	5.0	18.0	4.8	14.2	800	.2	148.2	150.8
5:00 a. m.	....	9,766,440	70	....	2.3	1.0	....	117,163	242	614	530	....	....	18.5	4.8	15.4	720	.2	151.6	154.7
5:20 a. m.	....	9 772,580	69	....	2.3	1.0	....	119,188	242	614	540	....	....	18.5	4.8	14.8	740	.2	146.8	150.2
5:30 a. m.	300	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	.....	....	.....	.....
5:40 a. m.	....	9,778,800	69	....	2.3	1.0	942,590	121,208	240	624	470	....	....	18.0	4.9	14.8	750	.2	147.2	149.8
6:00 a. m.	....	9,784,900	69	....	2.3	.9	....	123 233	242	624	530	....	....	18.5	4.9	14.8	780	.2	153.2	156.3
6:20 a. m.	....	9,791,300	69.0	....	2.3	.8	....	125,253	240	629	550	....	....	18.5	4.8	13.8	820	.2	146.4	149.3
6:40 a. m.	....	9,798,200	69.0	....	2.4	.4	944,250	127,266	240	624	580	....	....	18.3	4.9	13.2	850	.2	143.2	146.2
6:45 a. m.	300	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	.....	....	.....	.....
7:00 a. m.	....	9,805 000	69.0	....	2.4	.4	....	129,280	240	634	540	....	....	18.0	4.9	13.7	780	.2	136.1	138.7
7:20 a. m.	....	9,811,800	69.0	....	2.4	.2	....	131 295	240	614	620	....	....	18.0	5.0	12.7	900	.2	137.3	139.8

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[a] January 21.

Log of producer-gas test No. 19, West Virginia No. 8 coal, January 20, 21, 1905.—Concluded.

(Coal from mine of the Gauley Mountain Coal Company, Ansted, W. Va.)

Time.	Coal consumed by producer (pounds).	Gas meter (cubic feet).	Temperature of gas (°F.).	Water meter (cubic feet).	Manometers at gas meter (inches water). 1	Manometers at gas meter (inches water). 2	Auxiliary meters. Watt meter.	Speed counters on gas engine.	Load. Volts.	Load. Amperes.	Temperature of gas leaving producer (°C.).	Manometers at producer. Air entering (inches mercury).	Manometers at producer. Gas leaving (inches water).	Gas calorimeter. Temperature (°C.). Gas.	Gas calorimeter. Temperature (°C.). Water. Inlet.	Gas calorimeter. Temperature (°C.). Water. Outlet.	Gas calorimeter. Cubic centimeters of water collected.	Gas calorimeter. Cubic feet of gas.	Gas calorimeter. B. T. U. As read.	Gas calorimeter. B. T. U. Standardized.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
7:40 a. m.	....	9,819,100	69.0	....	2.1	.0	916,100	133,298	240	611	550	....	....	18.0	4.8	12.0	930	.2	132.9	135.3
8:00 a. m.	....	9,826,400	69.0	....	2.0	−1.0	....	135,306	240	575	610	....	....	18.0	4.7	11.5	920	.2	124.2	126.7
8:10 a. m.	300	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	.....	....	.....	.....
8:20 a. m.	....	9,834,200	69.0	....	2.0	.8	....	137,321	240	538	590	....	....	18.2	4.7	12.1	940	.2	143.6	146.5
8:40 a. m.	....	9,841,350	69.0	....	2.1	.3	947,950	139,336	238	624	650	....	....	18.0	4.8	12.0	920	.2	133.3	135.8
9:00 a. m.	....	9,848,400	69.0	....	2.1	.6	....	141,328	236	564	650	....	....	18.0	4.7	11.2	1,080	.2	139.3	141.9
9:10 a. m.	300	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	.....	....	.....	.....
9:20 a. m.	....	9,856,150	69.0	....	2.0	.8	....	143,311	242	524	670	.7	6.0	17.6	4.7	11.4	960	.2	125.4	127.7
9:40 a. m.	....	9,863,300	69.0	....	2.0	.6	949,700	145,312	238	524	650	....	....	17.8	4.7	11.0	1,110	.2	138.5	141.0
10:00 a. m.	....	9,870,600	69.0	....	2.1	.0	....	147,314	242	424	590	....	....	17.8	4.6	12.4	820	.2	127.0	129.3
10:20 a. m.	....	9,877,800	69.0	....	2.1	.0	....	149,333	242	624	560	....	....	17.8	4.4	12.7	890	.2	146.4	148.9
10:40 a. m.	....	9,884,650	69.0	....	2.2	+.2	951,100	151,351	241	634	560	....	....	18.0	4.3	12.9	890	.2	151.6	154.4
11:00 a. m.	....	9,891,650	70.0	....	2.1	.0	....	153,366	242	624	590	....	....	18.0	4.3	12.5	910	.2	148.0	151.1
11:20 a. m.	....	9,898,600	70.0	....	2.2	.4	....	155,380	243	624	550	....	....	17.8	4.2	13.2	800	.2	142.8	145.5
11:40 a. m.	....	9,905,000	70.5	....	2.2	.4	952,550	157,410	243	624	570	....	....	18.0	4.2	13.6	780	.2	145.6	148.6
12:00 m	....	9,911,480	70.0	....	2.2	.6	....	159,440	242	624	560	....	....	18.0	4.2	13.5	820	.2	151.2	153.8
12:10 p. m.	300	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	.....	....	.....	.....
12:20 p. m	....	9,917,800	70.0	....	2.2	0.7	....	161,466	244	614	440	....	....	18.0	4.4	14.7	780	.2	159.1	162.3
12:40 p. m	....	9,924,200	71.0	....	2.2	.6	954,260	163,496	244	624	470	....	....	18.5	4.6	14.7	810	.2	162.3	165.8
1:00 p. m.	....	9,930,500	71.0	....	2.3	.8	....	165,526	243	624	460	....	....	18.4	4.6	14.6	770	.2	152.8	156.1
1:20 p. m.	....	9,936,860	71.0	....	2.3	.8	....	167,553	242	624	580	....	....	18.3	4.7	14.5	800	.2	157.5	160.8
1:40 p. m.	....	9,943,350	71.0	....	2.2	.6	955,900	169,581	243	624	560	....	....	18.3	4.6	14.8	750	.2	151.6	154.7
2:00 p. m.	....	9,949,500	71.0	....	2.3	.8	....	171,615	242	629	500	....	....	18.5	4.6	14.5	780	.2	153.2	156.5
2:20 p. m.	....	9,955,700	70.5	....	2.2	.6	....	173,640	241	634	510	....	....	18.5	4.4	13.5	840	.2	151.6	154.8
2:25 p. m.	300	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	.....	....	.....	.....
2:40 p. m.	....	9,962,000	70.5	....	2.3	.8	957,600	175,663	242	624	520	.6	5.0	18.3	4.3	14.6	760	.2	155.1	158.3
3:00 p. m.	....	9,968,100	70.0	....	2.2	.7	....	177,698	241	619	580	....	....	18.3	4.4	13.9	810	.2	152.8	156.0
3:20 p. m.	....	9,974,600	70.0	....	2.2	.4	....	179,712	239	624	520	....	....	18.2	4.4	12.1	900	.2	137.7	140.2
3:40 p. m.	....	9,981,760	70.0	....	2.2	.3	....	181,719	239	624	520	....	....	....	....	....	.....	....	.....	.....

GAS ANALYSES.

Time.	CO_2.	O_2.	CO.	H_2.	CH_4.	N.	Total.	B. T. U.
9:45 a. m.[a]	7.4	0.0	13.2	6.2	7.0	66.2	100.0	142.3
11:45 a. m.	10.4	.2	11.6	10.8	5.5	61.5	100.0	136.6
1:45 p. m.	11.6	.4	10.6	9.0	6.1	62.3	100.0	133.3
3:45 p. m.	9.6	.6	13.4	8.4	6.6	61.4	100.0	139.9
5:45 p. m.	11.2	.2	12.8	11.0	6.1	58.7	100.0	147.6
7:45 p. m.	10.8	.2	11.6	10.5	5.5	61.4	100.0	139.6
9:45 p. m.	10.2	.2	13.0	9.7	6.3	60.6	100.0	146.2
11:45 p. m.	10.0	.0	12.2	11.2	6.2	60.4	100.0	147.6
1:45 a. m.[b]	10.8	.4	11.2	9.6	7.4	60.6	100.0	151.3
3:45 a. m.	11.0	.0	11.0	9.4	6.2	62.4	100.0	137.1
5:45 a. m.	10.6	.2	10.6	8.2	7.5	62.9	100.0	145.4
7:45 a. m.	11.4	.0	9.6	6.3	6.3	66.4	100.0	122.5
9:45 a. m.	13.2	.2	5.2	3.6	6.5	71.3	100.0	100.0
11:45 a. m.	10.4	.0	12.0	11.2	6.2	60.2	100.0	146.9
1:45 p. m.	9.6	.0	13.8	9.9	6.8	59.9	100.0	155.0

[a] January 20.
[b] January 21.

Producer-gas test No. 19, West Virginia No. 8 coal.

(Recorded by W. C. Weidmann and Kurt Toensfeldt, January 20, 21, 1905.)

1.	Duration of test, in hours		21

AVERAGE TEMPERATURE, °F.

2.	Gas leaving producer		847

OUTSIDE POWER CHARGED AGAINST PRODUCER PLANT.

7.	Total steam used by producer	pounds	5,775
8.	Steam used by producer per hour	do.	275
9.	Equivalent in pounds of coal per hour		36.1
10.	Equivalent in pounds of dry coal per hour		35.1
11.	Equivalent in pounds of combustible per hour		33
12.	Average horse-power required to drive auxiliary machinery		9.6

COAL CONSUMED IN PRODUCER.

16.	Total coal consumed	pounds	6,900
17.	Moisture in coal	per cent.	2.66
18.	Total dry coal consumed	pounds	6,720
19.	Refuse from dry coal	per cent.	5.92
20.	Total refuse from coal	pounds	397.8
21.	Total combustible consumed	do.	6,322.2
22.	Coal consumed in producer	do.	328.6
23.	Dry coal consumed in producer	do.	320.1
24.	Combustible consumed in producer	do.	301.1
25.	Equivalent coal used by producer plant	do.	364.7
26.	Equivalent dry coal used by producer plant	do.	355.1
27.	Equivalent combustible used by producer plant	do.	334.1

COAL CONSUMED PER SQUARE FOOT OF FUEL BED PER HOUR.

28.	Coal as fired	pounds	8.54
29.	Dry coal	do.	8.32
30.	Combustible	do.	7.84

BRITISH THERMAL UNITS FROM COAL.

31.	Per pound of coal as fired	14,168
32.	Per pound of dry coal	14,558
33.	Per pound of combustible	15,470
34.	From coal as fired, per hour	4,660,000
35.	From dry coal, per hour	4,660,000
36.	From combustible per hour	4,660,000

GAS PRODUCED, CUBIC FEET.

(Gas at 62° F. and 14.7 pounds pressure).

37.	Total	392,240
38.	Per hour	18,690
39.	Per pound coal consumed in producer	56.9
40.	Per pound dry coal consumed in producer	58.4
41.	Per pound combustible consumed in producer	62.
42.	Per pound equivalent coal used by producer plant	51.3
43.	Per pound equivalent dry coal used by producer plant	52.6
44.	Per pound equivalent combustible used by producer plant	55.9

BRITISH THERMAL UNITS FROM STANDARD GAS.

45.	Per cubic foot	155.1
46.	Per pound dry coal burned in producer	9,070
47.	Per hour per brake horse-power	12,340

AVERAGE HORSE-POWER DEVELOPED.

48.	Electrical horse-power available for outside purposes	199.3
49.	Electrical horse-power developed at switch-board	199.9
50.	Brake horse-power available for outside purposes	224
51.	Brake horse-power developed at engine	235

EFFICIENCIES.

52.	Of conversion and cleaning gas	.622
53.	Of producer plant	.558

COAL PER HORSE-POWER PER HOUR.

	Coal as Fired.	Dry Coal.	Combustible.
54. Pounds consumed in producer per electrical horse-power available for outside purposes	1.73	1.68	1.58
55. Pounds consumed in producer per electrical horse-power developed at switchboard	1.64	1.60	1.51
56. Pounds consumed in producer per brake horse-power[a] available for outside purposes	1.47	1.43	1.35
57. Pounds consumed in producer per brake horse-power[a] developed at engine	1.40	1.36	1.28
58. Equivalent pounds used by producer plant per electrical horse-power available for outside purposes	1.92	1.87	1.76
59. Equivalent pounds used by producer plant per electrical horse-power developed at switchboard	1.82	1.78	1.67
60. Equivalent pounds used by producer plant per brake horse-power[a] available for outside purposes	1.63	1.59	1.49
61. Equivalent pounds used by producer plant per brake horse-power[a] developed at engine	1.55	1.51	1.42

[a] Based on an assumed efficiency of 85 per cent. for generator and belt.

AVERAGE COMPOSITION OF COAL AND GAS.

62. Coal:	Per cent.
Moisture	2.66
Volatile matter	32.58
Fixed carbon	59.00
Ash	5.76
Total	100.00
Sulphur	0.94

63. Gas by volume:	Per cent.
Carbon dioxide (CO_2)	10.33
Oxygen (O_2)	0.22
Carbon monoxide (CO)	11.93
Hydrogen (H_2)	9.45
Methane (CH_4)	6.40
Nitrogen (N_2)	61.67
Total	100.00

"After the first twenty-one or twenty-two hours the load carried was somewhat irregular. On this account the report is made up from the records of the twenty-one hours from 9:40 a. m., January 20 to 6:40 a. m. January 21.

"This is a good producer coal, although it is hard to keep the fuel bed from getting hot on account of the large amount of pulverized coal in this particular sample. The gas was of good uniform quality. About 75 gallons of black tar were extracted."

GAS ENGINE.

Following are results of tests by gas engine:

Report of gas-engine test No. 19.

Recorded by K. Toensfeldt and W. C. Weidmann, January 20, 21, 1905. Producer test No. 19.

Coal: General number, West Virginia No. 8; special number, G. P. 19. Car initials and number, C. and O. 15945.

Duration of test, in hours	21
Revolutions per minute (mean)	202
Explosions per minute (mean)	101
Cubic feet gas per hour, by meter	19,090
Cubic feet standard gas per hour (i. e., 62° F., 14.7 pounds pressure)	18,680
Maximum pressure:	
First cylinder	238
Second cylinder	233
Third cylinder	257
Pressure at release:	
First cylinder	28
Second cylinder	29
Third cylinder	25.7
Mean effective pressure:	
First cylinder	60.5
Second cylinder	61.2
Third cylinder	53.3
Indicated horse-power:	
First cylinder	96.33
Second cylinder	97.40
Third cylinder	84 93
Total indicated horse-power	278.66
Horse-power delivered (electrical horse-power)	199.9
Mechanical efficiency (engine and generator combined) per cent	71.7
Cubic feet standard gas per hour per indicated horse-power	67
Cubic feet standard gas per hour per electrical horse-power	93.5

COKING TESTS.

"West Virginia No. 8 (Mine 52 on Map II).—Run-of-mine coal from Gauley Mountain Coal Company, Ansted, W. Va.

"This test was made on 11,000 pounds of unwashed coal, which was burned for 66 hours and yielded 7,124 pounds, or 64.7 per cent, of coke, and 589 pounds of ash and breeze. The coke was hard, of good color, although of somewhat irregular cell structure.

Chemical composition:	Coal.	Coke.
Moisture	3.82	2.79
Volatile Matter	31.77	0.53
Fixed Carbon	57.21	82.37
Ash	7.20	14.31
Sulphur	0.89	0.77
Phosphorus	.....	0.0116

Amount of coal charged in oven (pounds)	11,000
Coking time (hours)	66
Amount of coke produced (pounds)	7,124
Breeze and ash (pounds)	589
Specific gravity of coke	1.92
Per cent. of coke produced	64.7
Remarks: Hard, good color.	
Grams in 1 cubic inch (dry)	16.2
Grams in 1 cubic inch (wet)	23.89
Pounds in 1 cubic foot (dry)	61.56
Pounds in 1 cubic foot (wet)	90.78
Percentage by volume, coke	53
Percentage by volume, cells	47
Compressive strength per cubic inch (one-fourth ultimate strength) (pounds)	200
Height of furnace charge supported without crushing (feet)	8.0
Hardness of coke	3.0

"The coke made of this coal would be considered very fine if it did not show cross fractures which tend to make it brittle. It has a good color and a metallic ring, and is low in sulphur and phosphorus, though the ash is somewhat high. It is hard and will carry a good burden. The cell structure is irregular and by repeated handling the coke broke up into small pieces. The coal showed a large amount of slate, appearing again as ash in the coke, which could be reduced by washing."

Foundry (Cupola) Tests of Coke from Mine 52 on Map II.

ANALYSIS OF COKE.

	Per cent.
Sulphur	0.70
Sulphur in ash	0.04
Volatile Carbon	0.35
Fixed Carbon	86.38
Ash	12.52
Phosphorus	0.012
Moisture	0.75

Specific gravity, 1.94
Appearance, 8 (Connellsville, 10).

Charge (in pounds).

	1.	2.	3	4.	5.	Total.
Coke	220	54	52	52	52	430
Pig iron	660	398	398	398	396	2,250
Scrap	220	134	132	132	132	750

Record of Melt.

Blast pressure averages 7½ ounces. Blast on, 11:18 a.m. Iron running, 11:30 a.m. Iron in 12 minutes.

	Pounds.
Ladle No. 1, 11:36 a.m.	160
Ladle No. 2, 11:39 a.m.	200
Ladle No. 3, 11:42 a.m.	175
Ladle No. 4, 11:44 a.m.	210
Ladle No. 5, 11:46 a.m.	190
Ladle No. 6, 11:47 a.m.	245
Ladle No. 7, 11:49 a.m.	180
Ladle No. 8, 11:50 a.m.	245
Ladle No. 9, 11:52 a.m.	170
Ladle No. 10, 11:52 a.m.	240
Ladle No. 11, 11:56 a.m.	160
Ladle No. 12, 11:58 a.m.	175
Total iron poured	2,350
Rate (pounds per hour)	6,410
Iron recovered	445
Coke recovered	20

Melting loss, 6.8 per cent.

"Fluidity strips ran up well. Iron hot. Standard branch of foundry coke used for comparison. Good hot iron except at very last. The fixed condition of test required a heavier coke bed than is good practice with this heavy coke. Hence it took 12 minutes to get iron and left too little coke for the upper charges. Coke can be recommended for foundry use."

Signal Knob Coal Co. Mine—No. 53 on Map II.

On Mill Creek waters, 1.4 miles N. 30° E. of Ansted; **Campbell Creek (No. 2 Gas) Coal**; elevation, 1805′ B.; examined by Teets.

	Feet.	Inches.
Coal	5	0

"Principal office, Ansted, W. Va.: used for steam; shipped east; leased from Gauley Mountain Company; 24 miners and 20 laborers employed; daily capacity, 500 tons; daily output, 300 tons; mule haulage; R. C. Taylor, Superintendent of Gauley Mountain Coal Company, authority for mine data."

Craft & Evans Pine Top Mine—No. 54 on Map II.

On Mill Creek waters, ½ mile due south of Mine No. 52; **Campbell Creek (No. 2 Gas) Coal**; elevation, 1790′ B.; examined by the author.

			Feet.	Inches.
1. Sandstone				
2. Slate				
3. **Coal**, soft	0′	10″		
4. Slate, gray, soft	0	6		
5. **Coal**, soft	0	2		
6. Slate, black	0	1		
7. **Coal**, soft	1	9		
8. **Coal**, semi-splint	1	6		
9. Slate, 1″ to (sometimes 15′)	1	0		
10. **Coal**, gas, soft, with 2″ bone in middle	1	1	6	11
11. Slate				

"Butts, N. 65° E.; faces, S. 25° E.; greatest rise, S. 30° E.; mine capacity, 125 tons; men employed, 10; coal shipped east by rail for domestic and general fuel purposes with the Gauley Mountain Coal Company's output; sample from Nos. 3, 5, 7, and 8, the analysis of which was published by Dr. White under No. 20 on page 394 of Volume II(A) and republished by him under the same number on page 265 of Bulletin 2 of the Survey.

"The slate No. 9 varies greatly in thickness, sometimes thinning away entirely, and again increasing to 15 feet or more. When it thickens the coal (No. 10) below is not mined."

The above-mentioned analysis is given under **Mine No. 54** in Table 1 at the end of this Chapter. The mine was abandoned when this region was visited in 1916.

Coal Opening—No. 341 on Map II.

On Shade Creek, east side of hill road, 1.8 miles N. 50° E. of Ansted; **Campbell Creek (No. 2 Gas) Coal**; elevation, 1945′ B.; examined by author.

			Feet.	Inches.
Sandstone, visible			8	0
Coal, soft, columnar	0′	11″		
Shale, dark-gray	0	1		
Coal, soft, columnar	0	8		
Shale, dark, ½″ to	0	1		
Coal, soft, 1″ to	0	2		
Slate, dark-gray	0	2		
Coal, medium-soft, columnar	2	9	4	10
Slate, gray				

Coal Prospect—No. 341A on Map II, on south hillside, ½ mile northeast of Ansted; **Campbell Creek (No. 2 Gas) Coal**; elevation, 1885′ B.; examined by author, was closed and thickness not learned.

Coal Exposure—No. 342 on Map II.

In hill road, ½ mile west of Ansted; **Campbell Creek (No. 2 Gas); Coal**; elevation, 1820′ B.; examined by author.

	Feet.	Inches.
Coal blossom, heavy, on bench	5	0

Andrew McGraw Coal Opening—No. 343 on Map II.

On west side of branch of Turkey Creek, 1.6 miles N. 20° W. of Hawks Nest; **Campbell Creek (No. 2 Gas) Coal**; elevation, 1735′ B.; examined by Teets.

			Feet.	Inches.
Coal (slate roof)	0′	7″		
Slate	1	1		
Coal	0	2		
Slate	0	3		
Coal, gas	1	2		
Bone	0	2		
Coal	2	0		
Coal, splint (slate floor)	0	4	5	9

Allen Parish Coal Opening—No. 344 on Map II.

On west side of branch of Turkey Creek, 1.5 miles N. 20° W. of Hawks Nest; **Campbell Creek (No. 2 Gas) Coal**; elevation, 1740′ B.

			Feet.	Inches.
Coal, gas (slate roof)	0′	9″		
Slate	1	2		
Coal	0	2		
Slate	0	4		
Coal, gas	1	2		
Bone	0	2		
Coal, gas	2	1		
Slate, gray	0	1		
Coal, splint (slate floor)	0	3	6	2

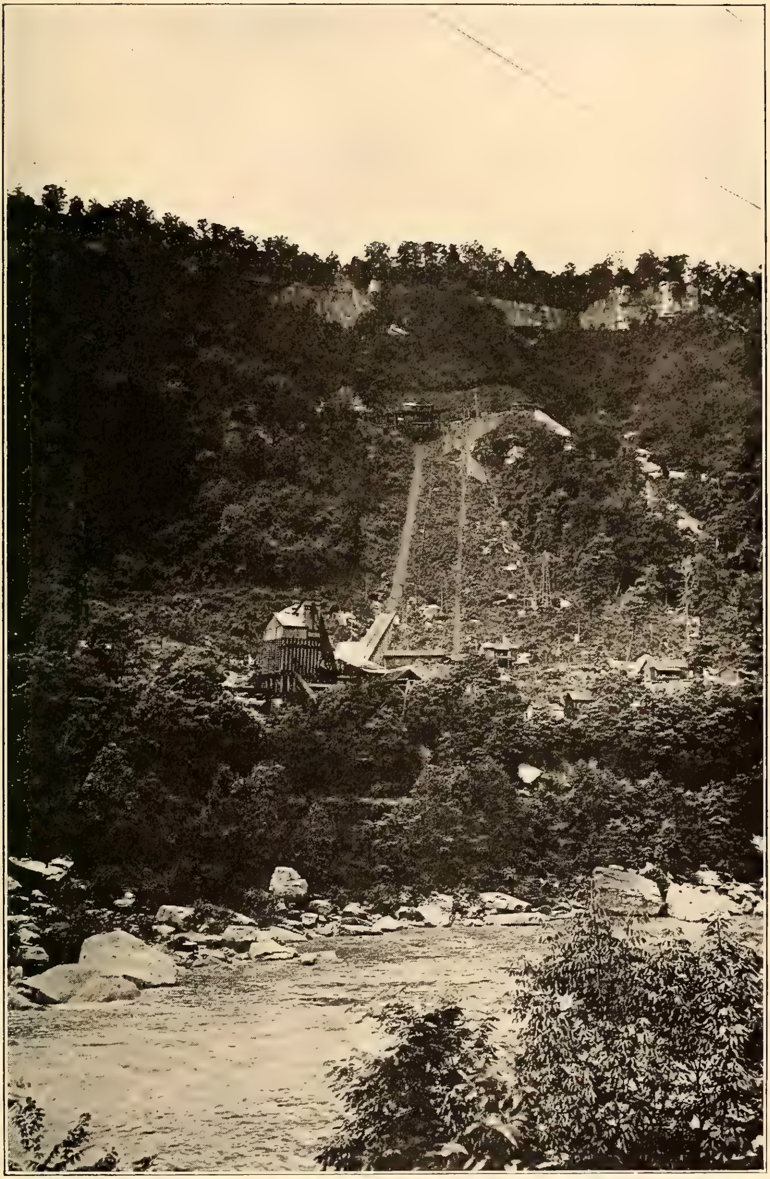

Photo furnished by C. E. Krebs.

PLATE XIX.—View showing coal tipple and incline railway to opening in Sewell Coal of Marr Branch Coal Co., on west hillside of New River at Whitney; cliffs of Lower Nuttall Sandstone near sky-line.

Lydia Dempsey Coal Opening—No. 345 on Map II.

On west side of branch of Turkey Creek, 1.3 miles N. 25° W. of Hawks Nest; **Campbell Creek (No. 2 Gas) Coal**; elevation, 1745′ B.; section taken 25 feet under hill by Teets.

			Feet.	Inches.
Coal, gas (slate roof)	0′	7″		
Slate, gray	1	0		
Coal	0	2		
Slate, gray	0	3		
Coal, gas	1	4		
Coal, bony	0	2		
Coal, gas	2	0		
Coal splint (slate floor)	0	3	5	9

Coal Opening—No. 348 on Map II.

On head of Turkey Creek, 2.1 miles due north of Hawks Nest; **Campbell Creek (No. 2 Gas) Coal**; elevation, 1735′ B.; examined by Teets.

				Feet.	Inches.
1.	Slate				
2.	**Coal**, gas	1′	1″		
3.	Slate, dark	0	6		
4.	**Coal**	0	2		
5.	Slate	0	2		
6.	**Coal**	3	1	5	0
7.	Slate				

No. 6 of section runs regular throughout the mine. The slate, No. 3 of section, thickens and thins rapidly; will change to 12 or 18 inches in 200 or 300 feet. The above section was measured in No. 3 entry west.

J. H. McMichen Coal Opening—No. 346 on Map II.

On west hillside of Big Creek, 2½ miles north of Cotton Hill; **Campbell Creek (No. 2 Gas) Coal**; elevation, 1690′ B.; examined by Teets.

			Feet.	Inches.
Coal, (slate roof)	0′	2″		
Slate	0	3		
Coal, gas	1	4		
Bone	0	2		
Coal (slate floor)	2	3	4	2

Joseph Tenber Coal Opening—No. 347 on Map II.

On west hillside of Big Creek, ¼ mile northeast of Opening No. 346; **Campbell Creek (No. 2 Gas) Coal**; elevation, 1650' B.; examined by Teets.

	Feet.	Inches.
Sandstone, massive, visible....................	10	0
Coal, reported (slate floor).....................	4	6

Quantity of Campbell Creek (Peerless and No. 2 Gas) Coal Available.

Either the Peerless or No. 2 Gas members of the Campbell Creek Coal, or both, appear to be minable throughout the region of their occurrence in Fayette. Based on the evidence given on the preceding pages and a planimetric determination by A. M. Hagan of the area of this bed as limited on Figure 13, page 499, from Map II, the following estimate is made by the author for the available tonnage in the County:

Probable Amount of Campbell Creek (Peerless and No. 2 Gas) Coal.

District.	Thickness of Coal Assumed, Feet.	Square Miles.	Acres.	Cubic Feet of Coal.	Short Tons of Coal.
Falls	6	49.14	31,449.6	8,219,667,456	328,786,698
Kanawha	8	44.29	28,345.6	9,877,874,688	395,114,988
Mountain Cove......	7	2.87	1,836.8	560,077,056	22,403,082
Fayetteville	7	2.68	1,715.2	522,998,784	20,919,951
Totals for County	....	98.98	63,347.2	19,180,617,984	767,224,719

THE POWELLTON (BROWNSTOWN) COAL.

The Powellton (Brownstown) Coal, described briefly in Chapter VI, page 256, appears to attain minable dimensions and regularity over most of the area indicated for this bed on Figure 14. It has been mined commercially in both Falls and Kanawha Districts, and it has been prospected considerably by the large land-holding companies. Its thickness and character at these openings and other exposures will now be described by magisterial districts.

Falls District.

The Powellton (Brownstown) Coal outcrops above drainage in Falls District except in the northwest border, as shown on Figure 14. Its thickness and stratigraphic position in this District are exhibited in the sections published in Chapter IV for Cannelton, Boomer, Boomer — ¾ Mile East, Vanetta, Gamoca, Wyndal, and Albion, and in the logs of Coal Test Borings Nos. 1-7, inclusive, on Map II, all of which are referenced in the Index. It was once mined for a short time on a commercial scale in Falls District, according to Teets, who obtained the following data at this abandoned opening:

Lynchburg Colliery Co. Mine—No. 57 on Map II.

On south hillside of Sand Branch, 0.9 mile due east of Vanetta; **Powellton (Brownstown) Coal**; elevation, 1330′ B.; examined by Teets.

			Feet.	Inches.
Sandstone, **Brownstown**, massive, medium-grained, visible			40	0
Slate, gray			2	0
Coal, gas	0′	8″		
Slate and **coal**, impure	0	2		
Coal, medium-hard	0	11		
Slate, black	0	1		
Coal, gas, to water	1	2	3	0
Concealed by water				

The above opening occurs 66 feet by hand-level under the No. 2 Gas Coal, according to Teets.

Coal Opening—No. 348A on Map II.

On west hillside of Lick Branch of Rich Creek, 1.3 miles south of Jodie; **Powellton (Brownstown) Coal**; elevation, 1150′ B.; examined by Teets.

			Feet.	Inches.
Slate, iron ore nodules, visible			10	0
Coal, gas	1′	1″		
Bone	0	2		
Coal	1	3		
Slate, gray	0	2		
Coal, gas	3	6	6	2

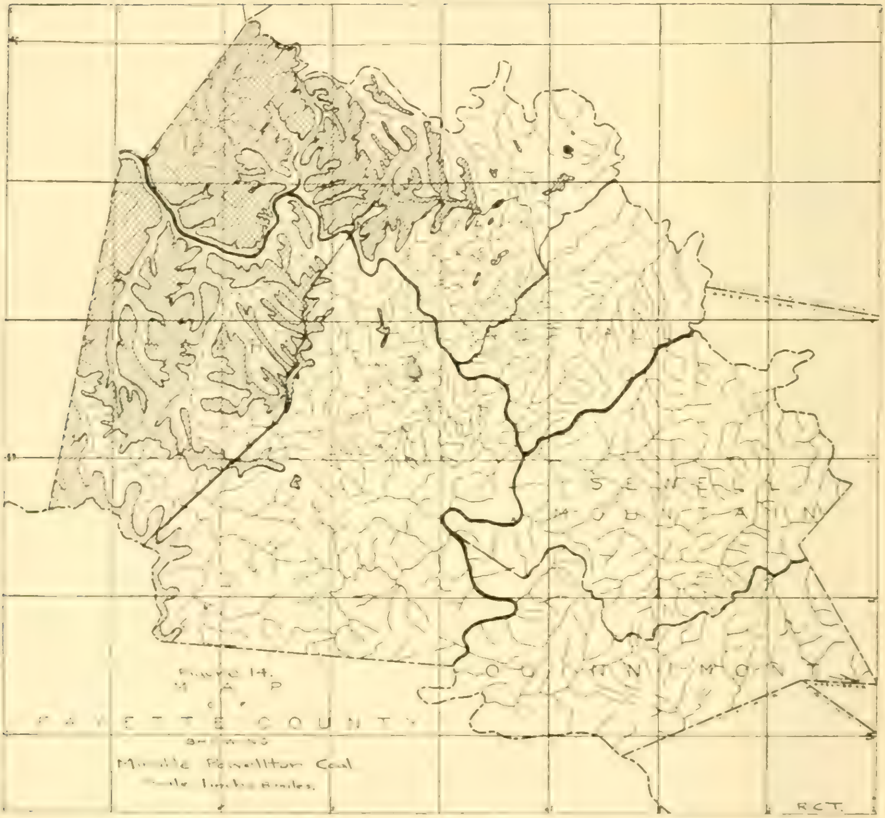
Figure 14.
MAP
of
FAYETTE COUNTY
SHOWING
Middle Powellton Coal
Scale 1 inch 8 miles.

Gauley Mountain Coal Co. Opening—No. 349 on Map II.

On east hillside of Rich Creek, opposite mouth of Bridge Fork; **Powellton (Brownstown) Coal**; elevation, 1220′ B.; section reported to Teets.

			Feet.	Inches.
Coal (slate roof)	2′	5″		
Slate	0	3		
Coal	1	3	3	11

Kanawha District.

In Kanawha District, the Powellton (Brownstown) Coal attains a fine development and has been mined extensively on a commercial scale on the waters of Armstrong and Paint Creeks, where it is easily accessible to drift openings. Its thickness and stratigraphic position are exhibited in the sections published in Chapter IV for Mt. Carbon, Beckwith, Kimberly, Columbia—1.2 Miles Southwest, Elk Ridge, Powellton—½ Mile Northwest, Head of Powellton Fork, Page, Head of Johnson Fork, Keeferton, Kingston—1.7 Miles West, and Kingston, page references to which are given in the Index; in the logs of Wells Nos. 22 and 48 on Map II; and in the log of Coal Test Boring No. 12 on Map II, just in the edge of Kanawha County, page 397.

Mt. Carbon Co., Ltd., Vulcan Mine (Abandoned)—
No. 58 on Map II.

On east hillside of Powellton Fork, 2.2 miles southeast of Powellton; **Powellton (Brownstown) Coal**; elevation, 1590′ B.; examined by the author.

			Feet.	Inches.
Sandstone, **Brownstown**, brown, micaceous, visible			25	0
Shale, sandy, buff, plant fossils			8	0
Bone	0′	5″		
Coal	2	4		
Slate	0	3		
Coal	3	6	6	6

"Draw slate was reported by A. P. Brady as varying from 1 to 20 feet. Butts, N. 77° E.; faces, N. 13° W. The above mine has been abandoned for 7 years. The opening occurs 100 feet above the Eagle Coal."

The analysis of a sample of the coal collected by Mr. Brady, as reported by Prof. Hite and published by Dr. White on page 589 of Volume II and republished by him on page 258 of Bulletin 2 and page 344 of Volume II(A) of the Survey, is given under **Mine No. 58** in Table 1 at the end of this Chapter.

Mr. Brady also collected a sample of the coke made at the above mine for analysis by Prof. Hite, whose report, as published by Dr. White under No. 4 on page 590 of Volume II and republished by him under the same number on page 259 of Bulletin 2, is given under **Mine No. 58** in Table 2.

In Table 3 at the end of this Chapter, three analyses are given under **Mine No. 58** under laboratory Nos. 1208, 1209, and 1561. The bed was measured and sampled at two points by J. S. Burrows of the U. S. Geological Survey on October 6, 1904; section A (sample 1208) was measured in an entry on the extreme north side of the mine, with a total bed thickness of 6′ 5″ and a thickness of coal sampled of 5′ 6″; while section B (sample 1209) was measured on the extreme south side of the mine, where the coal bed had a thickness of 5′ 1″ and the portion sampled measured 4′ 5″. Sample 1561 was from a carload of 30 tons of run-of-mine coal. These analyses were published on page 237 of Bulletin 22, U. S. Bureau of Mines, and also on page 57 of Bulletin 261 of the U. S. Geological Survey, while the sections measured by Mr. Burrows were published on page 939 of Bulletin 22 referred to above.

"For results of tests of this coal, see mention of specific tests as follows—steaming tests: U. S. Geol. Survey Prof. Paper 48, pages 889-896; Bull. 261, page 82; Bureau of Mines Bull. 23, page 69; producer-gas tests: U. S. Geol. Survey Prof. Paper 48, pages 1269-91; Bull. 261, page 112; Bureau of Mines Bull. 13, pages 217, 276; washing tests: U. S. Geol. Survey Prof. Paper 48, page 1473; Bull. 261, pages 72-3; coking tests: U. S. Geol. Survey Prof. Paper 48, pages 1363-4; Bull. 261, pages 128, 132-3.

"For additional chemical analyses, see U. S. Geol. Survey Prof. Paper 48, page 257; Bull. 261, p. 57."

A number of the tests mentioned above are given on the following pages as taken from the Reports cited.

STEAMING TESTS.

Test No. 69.—Regular and special observations on test of West Virginia No. 9 coal, November 30, 1904.

REGULAR.

(Duration of trial, 10 hours.)

Time.	Steam pressure gage.	Temperatures.			Calorimeter.		Draft pressures.		Flue gases.		
		Outside.	Boiler room.	Flue gases, base of stack.	Steam discharge.	Water separated in 10 minutes	In hood in inches of water.	In furnace in inches of water.	CO_2	O_2	CO.
	Lbs.	°F.	°F.	°F.	Lbs.	Lbs.			P.C.	P.C.	P.C.
7:49 ..	83	25	40	566	......	......	0.57	0.20	8.2	11.9	0.0
8:00 ..	92	26	41	566	4.61	0.077	.61	.20	......	......	......
8:20 ..	104	27	43	565	......	......	.60	.24	......	......	......
8:40 ..	85	28	43	600	......	......	.65	.17	8.6	11.0	.0
9:00 ..	90	29	45	560	4.38	.031	.46	.18	......	......	......
9:20 ..	84	30	46	580	......	......	.63	.21	......	......	......
9:40 ..	93	32	47	582	......	......	.48	.17	9.8	9.8	.0
10:00 ..	97	33	49	563	4.77	.03	.46	.17	......	......	......
10:20 ..	99	33	50	550	......	......	.45	.20	......	......	......
10:40 ..	91	35	51	572	......	......	.45	.20	9.0	10.7	.0
11:00 ..	85	36	53	566	4.56	.045	.42	.13	......	......	......
11:20 ..	102	37	54	612	......	......	.67	.22	......	......	......
11:40 ..	95	39	55	567	......	......	.42	.16	0.2	10.6	.0
12:00 ..	100	38	55	567	4.89	.078	.42	.16	......	......	......
12:20 ..	101	39	55	562	......	......	.48	.19	......	......	......
12:40 ..	99	39	56	602	......	......	.48	.13	9.0	10.9	.0
1:00 ..	91	40	57	590	4.89	.069	.51	.17	......	......	......
1:20 ..	98	40	58	569	......	......	.58	.22	......	......	......
1:40 ..	97	40	59	587	......	......	.45	.15	9.4	10.5	.3
2:00 ..	103	40	60	592	4.92	.022	.45	.17	......	......	......
2:20 ..	101	40	60	571	......	......	.41	.18	......	......	......
2:40 ..	97	40	60	576	......	......	.52	.21	8.7	10.6	.0
3:00 ..	99	40	60	587	4.84	.042	.46	.17	......	......	......
3:20 ..	96	40	60	572	......	......	.38	.17	......	......	......
3:40 ..	97	40	60	587	......	......	.58	.30	8.8	11.8	.3
4:00 ..	96	40	59	602	4.72	.041	.46	.18	......	......	......
4:20 ..	101	39	59	586	......	......	.48	.20	......	......	......
4:40 ..	102	38	59	579	......	......	.44	.17	7.0	13.3	.0
5:00 ..	91	37	57	537	4.61	.1	......	......	......	......	......
5:20 ..	83	......	55	556	......	......	.47	.14	......	......	......
5:49 ..	83	......	......	586	......	......	.48	.09	......	......	......
Total..	2,935	1,040	1,606	17,857	47.19	.535	14.92	5.45	87.7	111.10	.6
Average	94.7	36	53.5	576	4.72	.0535	.497	.182	8.77	11.10	.06

Test No. 69.—Regular and special observations on test of West Virginia No. 9 coal, November 30, 1904.

Continued.

SPECIAL.

Time	Height of water		Weight of coal burned.		Weight of water fed to boiler.	
	In tank.	In gage glass	During period.	Total.	During period.	Total.
	Inches.	Inches.	Pounds.	Pounds.	Pounds.	Pounds.
Start, 7:49	40	2¼	....	....	....	....
8:25	41	3	700	700	2,855	2,855
9:11	23½	2½	700	1,400	5,644	8,499
10:01	30½	3½	700	2,100	4,952	13,451
10:55	21¼	4	700	2,800	6,084	19,535
11:49	15¼	5	700	3,500	5,719	25,254
12:48	29¼	3	700	4,200	6,202	31,456
1:40	20¼	4¾	700	4,900	5,005	36,461
2:42	30½	3	700	5,600	6,972	43,433
3:38	18½	4¼	700	6,300	5,353	48,786
4:46	27	6	700	7,000	6,509	55,295
Close, 5:49	40	2¼	464	7,464	5,356	60,001

RECORD OF FURNACE CONDITIONS.

Time.	Observation.	Time.	Observation.
	No load on boiler during night.	1:02	Fire raked.
7:00	Fire cleaned.	1:52	Fire raked, 8 inches thick.
7:49	Test started, fire 3 inches thick.	2:22	Fire raked, 10 inches thick.
8:19	Fire raked, 6 inches thick.	3:02	Fire raked, 10 inches thick.
9:22	Fire raked, 8 inches thick.	3:25	Fire raked, 10 inches thick.
9:45	Fire raked, 9 inches thick.	4:10	Fire raked, 9 inches thick.
10:15	Fire raked, 10 inches thick.	4:53	Fire raked, 8 inches thick.
11:02	Fire raked, 10 inches thick.	4:56	Cleaning fire.
11:28	Fire raked, 10 inches thick.	5:04	Fire cleaned; no clinkers, only large
12:05	Fire raked, 10 inches thick.		pieces of free ash on grate.
12:27	Fire sliced; no clinkers on grate.	5:49	Test closed, fire 3 inches thick.

Refuse light in weight and white in color. Coal burned freely, with a white flame. Fire handled easily. 94 firings during test.

Steam test of West Virginia No. 9 coal.

CONDITIONS OF BOILER TRIAL.

Test number, 69.

Made by boiler division, United States Geological Survey.

At fuel-testing plant, Louisiana Purchase Exposition, St. Louis, Mo.

Kind of boiler, Heine safety.

To determine the economy of coal as a fuel.

Principal conditions governing trial, see general report. Steam jets not operated. Hughes apparatus operated.

Kind of fuel, West Virginia No. 9.

Kind of furnace, hand fired.

State of the weather, clear.

Method of starting and stopping the test, alternate.

Number of boiler (plant number), 2.

Type of boiler, water tube.

1.	Date of trial, November 30, 1904.		
2.	Duration of trial	hours	10
3.	Grate surface	square feet	40.55

3.1	Width of grate	feet	6.16
3.2	Length of grate	do.	6.58
4.	Height of furnace	inches	26
5.	Approximate width of air spaces in grate,	inch	.5
6.	Proportion of air space to whole grate surface	per cent.	44
6.1	Area of chimney	square feet	7.67
6.2	Height of chimney above grate	feet	113.25
6.3	Length of flue connecting to chimney	do.	None.
6.4	Kind of draft		Natural.
7.	Water-heating surface	square feet	2,031
7.4	Outside diameter of shell	inches	42.94
7.2	Length of shell (outside to outside of heads)	feet	21.58
7.3	Number of tubes		116
7.4	Diameter of tubes (outside-inside)	inches do.	3.5 3.26
7.5	Length of tubes exposed	feet	17.87
8.	Superheating surface	square feet	None.
9.	Ratio of water-heating surface to grate surface		50.1:1
10.	Ratio of minimum draft area to grate surface		1:9.1

AVERAGE PRESSURE.

11.	Barometer	inches of mercury pounds	29.61 14.53
11.1	Steam pressure by gage per square inch	do. do.	94.7 [a]109.23
12.	Force of draft between damper and boiler	inches of water	.50
13.	Force of draft in furnace	do.	.18
14.	Force of draft or blast in ash pit	do.	0

AVERAGE TEMPERATURES.

15.	Of external air	degrees	36
16.	Of fireroom	do.	53.5
17.	Of steam	do.	334
18.	Of feed water in tank	do.	48
19.	Of feed water entering economizer	do.	....
20.	Of feed water entering boiler	do.	179
21.	Of escaping gases from boiler	do.	576
22.	Of escaping gases from economizer	do.	....
22.1	Of furnace	do.	....

FUEL.

23.	Size or condition: Nut—small, 30 per cent.; slack, 70 per cent.; bright.		
24.	Weight of wood used in lighting fire	pounds	None.
24.	Weight of coal as fired	do.	7,464
26.	Percentage of moisture in coal		3.42

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[a] Absolute.

27.	Total weight of dry coal consumed	pounds	7,209
28.	Total ash and refuse	do.	573
29.	Quality of ash and refuse, clinker	per cent.	43
30.	Total combustible consumed	pounds do.	6,636 [a]6,625
31.	Percentage of ash and refuse in dry coal		7.95

PROXIMATE ANALYSIS OF COAL.

		Per cent. of coal.	Per cent. of combustible.
32.	Fixed carbon	59.47	65.64
33.	Volatile matter	31.11	34.36
34.	Moisture	3.42	.....
35.	Ash	6.00	.....
		100.00	100.00
36.	Sulphur, separately determined	.82	.....

ULTIMATE ANALYSIS OF DRY COAL.

37.	Carbon (C)	80.70	86.04
38.	Hydrogen (H)	5.01	5.34
39.	Oxygen (O)	5.57	5.94
40.	Nitrogen (N)	1.66	1.77
41.	Sulphur (S)	0.85	0.91
42.	Ash	6.21	.....
		100.00	100.00
43.	Moisture in sample of coal as received	3.42	.....

ANALYSIS OF ASH AND REFUSE.

44.	Carbon	per cent.	23.68
45.	Earthy matter	do.	76.32

FUEL PER HOUR.

46.	Dry coal consumed per hour	pounds	721
47.	Combustible consumed per hour	do. do.	664 [a]663
48.	Dry coal per square foot of grate surface per hour	do.	17.78
49.	Combustible per square foot of water-heating surface per hour	do. do.	.327 [a].326

CALORIFIC VALUE OF FUEL.

50.	Calorific value by oxygen calorimeter per pound of dry coal, B.T.U.	14,616
51.	Calorific value by oxygen calorimeter per pound of combustible, B.T.U.	15.584
52.	Calorific value by analysis per pound of dry coal, B.T.U.	14,445
53.	Calorific value by analysis per pound of combustible, B.T.U.	15,401

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[a] Calculated from chemistry of ash.

QUALITY OF STEAM.

54.	Percentage of moisture in steam		1.122
55.	Number of degrees of superheating		None.
56.	Quality of steam (dry steam=unity)	per cent.	99.155

WATER.

57.	Total weight of water fed to boiler	pounds	60,651
58.	Equivalent water fed to boiler from and at 212°	do.	73,339
59.	Water actually evaporated, corrected for quality of steam	do.	60,138
60.	Factor of evaporation		1.2092
61.	Equivalent water evaporated into dry steam from and at 212°	pounds	72,719

WATER PER HOUR.

62.	Water evaporated per hour, corrected for quality of steam	pounds	6,014
63.	Equivalent evaporation per hour from and at 212°	do.	7,272
64.	Equivalent evaporation per hour from and at 212° per square foot of water-heating surface	pounds	3.58

HORSE-POWER.

65.	Horse-power developed (34½ pounds of water evaporated per hour into dry steam from and at 212°= 1 horse-power)		210.8
66.	Builders' rated horse-power		210
67.	Percentage of builders' rated horse-power developed		100.38

ECONOMIC RESULTS.

68.	Water apparently evaporated under actual conditions per pound of coal as fired. (Item 57÷item 25)	pounds	8.13
69.	Equivalent evaporation from and at 212° per pound of coal as fired. (Item 61÷item 25),	pounds	9.74
70.	Equivalent evaporation from and at 212° per pound of dry coal. (Item 61÷item 27)	pounds	10.09
71.	Equivalent evaporation from and at 212° per pound of combustible. (Item 61÷item 30)	do. do.	10.96 [a]10.98

EFFICIENCY.

72.	Efficiency of the boiler (heat absorbed by the boiler per pound of combustible divided by the heat value of 1 pound of combustible)	per cent	67.92
73.	Efficiency of boiler, including the grate (heat absorbed by boiler per pound of dry coal divided by the heat value of 1 pound of dry coal)	per cent.	66.66

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[a] Calculated from chemistry of ash.

COST OF EVAPORATION.

74.	Cost of coal per ton of 2,000 pounds delivered in boiler room (assumed)		$1.00
75.	Cost of fuel for evaporating 1,000 pounds of water under observed conditions		$0.0615
76.	Cost of fuel used for evaporating 1,000 pounds of water from and at 212°		$0.0513

SMOKE OBSERVATIONS.

77.	Percentage of smoke as observed		28.2
78.	Weight of soot per hour obtained from smoke meter	ounces	....
79.	Volume of soot per hour obtained from smoke meter	cubic inches	....

METHODS OF FIRING.

80.	Kind of firing (spreading, alternate or coking)		Alternate.
81.	Average thickness of fire	inches	9
82.	Average intervals between firing for each furnace during time when fires are in normal condition	minutes	6.4
83.	Average intervals between times of leveling or breaking up	do.	38

ANALYSIS OF THE DRY GASES.

84.	Carbon dioxide (CO_2)	per cent.	8.77
85.	Oxygen (O)	do.	11.11
86.	Carbon monoxide (CO)	do.	.06
87.	Hydrogen and hydrocarbons	do.	.....
88.	Nitrogen (by difference) (N)	do.	80.06

HEAT BALANCE, OR DISTRIBUTION OF THE HEATING VALUE OF THE COMBUSTIBLE.

Total heat value of 1 pound of combustible, B.T.U. 15,584

		B.T.U.	Per cent.
1.	Heat absorbed by the boiler=evaporation from and at 212° per pound of combustible × 965.7..	10,603	[a]68.04
2.	Loss due to moisture in coal=per cent. of moisture referred to combustible ÷ 100 × [(212-t) + 966 + 0.48(T-212)] (t=temperature of air in the boiler room; T=that of flue gases)............	49	.31
3.	Loss due to moisture formed by the burning of hydrogen=per cent. of hydrogen to combustible ÷ 100 × 9 × [(212-t) + 966 + 0.48 (T-212)]	624	4.01
4.	Loss due to the heat carried away in the dry chimney gases=weight of gas per pound of combustible × 0.24 × (T-t)	3,364	21.59
5.	Loss due to complete combustion of carbon= $\frac{CO}{CO_2+CO} \times \frac{\text{per cent. C in combustible}}{100} \times 10{,}150$ ..	59	.38
6.	Loss due to unconsumed hydrogen and hydrocarbons, to heating the moisture in the air, to radiation, and unaccounted for. (Some of these losses may be separately itemized if data are obtained from which they may be calculated)	885	5.67
			100.00

REMARKS.

Dry coal per indicated horse-power hour=2.8 pounds.
Dry coal per electrical horse-power hour=3.46 pounds.

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[a] Calculated from chemistry of ash.

PRODUCER-GAS TESTS.

GENERAL RESULTS.

Log of producer-gas test No. 17, West Virginia No. 9 coal, December 19, 1904.

[Coal from Vulcan mine of the Mount Carbon Coal Companw (Limited), Powellton, W. Va.]

Time.	Coal consumed by producer (pounds).	Gas meter (cubic feet).	Temperature of gas (°F.).	Water meter (cubic feet).	Manometers at gas meter (inches water)		Auxiliary motors. Watt meter	Speed counters on gas engine.	Load.		Temperature of gas leaving producer (°C.)	Manometers at producer.		Gas calorimeter.						
														Temperatures (°C.).			Cubic centimeters of water collected.	Cubic feet of gas.	B. T. U.	
															Water.					
					1	2			Volts.	Amperes		Air entering (inches mercury).	Gas leaving (inches water).	Gas.	Inlet.	Outlet.			As read.	Standardized
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
11:40 a. m.[a]	....	8,658,100	61.0	....	2.3	0.6	793,150	0,000	240	518	340	....	....	....	....	....	....	....	....	....
12:00 m.	300	8,664,000	63.0	....	2.4	.9	....	2,027	240	518	....	....	....	27.0	5.0	13.2	940	0.2	152.8	158.4
12:20 p. m.	....	8,669,300	65.0	....	2.5	1.1	....	4,058	239	518	....	....	....	25.8	4.9	13.1	960	.2	155.9	161.0
12:40 p. m.	....	8,674,200	67.0	....	2.5	1.1	795,760	6,086	238	528	390	0.4	4.0	23.0	4.8	13.4	950	.2	161.9	165.8
1:00 p. m.	300	8,679,170	67.0	....	2.5	1.2	....	8,111	236	538	....	....	....	22.0	5.0	13.0	980	.2	155.5	158.8
1:20 p. m.	....	8,684,250	67.0	....	2.5	1.1	....	10,137	235	528	....	....	....	22.0	5.0	13.1	980	.2	157.1	160.3
1:40 p. m.	....	8,689,260	68.0	....	2.4	1.1	798,120	12,160	240	518	390	.4	4.5	21.7	5.0	12.7	1,000	.2	152.7	155.7
2:00 p. m.	300	8,694,540	69.0	....	2.5	1.0	....	14,168	239	518	....	....	....	20.8	5.0	12.7	1,000	.2	152.7	155.2
2:20 p. m.	....	8,699,740	69.0	....	2.5	1.0	....	16,210	240	518	....	....	....	20.0	5.1	12.7	1,010	.2	153.0	155.0
2:40 p. m.	....	8,704,760	68.0	....	2.5	1.0	801,130	18,238	240	518	400	.4	5.0	19.0	5.1	12.7	1,010	.2	153.0	153.2
3:00 p. m.	....	8,710,000	68.0	....	2.5	1.0	....	20,262	241	528	....	....	....	19.0	5.1	13.65	850	.2	144.0	144.1
3:20 p. m.	....	8,715,200	68.0	....	2.5	1.0	....	22,284	241	528	....	....	....	18.5	4.9	13.75	820	.2	143.6	144.8
3:30 p. m.	300	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
3:40 p. m.	....	8,720,600	68.0	....	2.4	.5	803,580	24,312	240	518	460	....	....	18.0	4.8	12.8	850	.2	134.9	135.7
4:00 p. m.	....	8,726,150	67.0	....	2.4	1.0	....	26,339	241	538	....	....	....	17.7	4.8	13.7	850	.2	150.0	156.8
4:20 p. m.	....	8,731,510	67.5	....	2.4	.9	....	28,368	239	528	....	....	....	17.0	4.6	13.3	820	.2	141.3	141.7
4:40 p. m.	....	8,737,100	67.0	....	2.4	.8	806,380	30,384	240	538	420	....	....	16.5	4.7	12.6	850	.2	133.0	133.2
4:45 p. m.	300	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
5:00 p. m.	....	8,742,920	67.0	....	2.4	.8	....	32,404	240	523	....	....	....	16.5	4.8	12.3	940	.2	140.0	140.2
5:20 p. m.[b]	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....

[a] Average barometer for entire test, 29.78 inches. Test began at 9 a. m., but engine could not carry full load. At 9:20 a. m. one of the engine bearings was hot, necessitating further delay. Another start was made at 11:10 a. m. on a load of 500 amperes.

[b] As the point of ignition was not right the engine was shut down for twenty minutes at 5:20 p. m. for the necessary change.

Log of producer-gas test No. 17, West Virginia No. 9 coal, December 19, 1904—Continued.

[Coal from Vulcan mine of the Mount Carbon Coal Company (Limited), Powellton, W. Va.]

Time.	Coal consumed by producer (pounds).	Gas meter (cubic feet).	Temperature of gas (°F.).	Water meter (cubic feet).	Manometers at gas meter (inches water).		Auxiliary motors. Watt meter.	Speed countes load on gas engine.			Temperature of gas leaving producer (°C.).	Manometers at producer.		Gas calorimeter.						
														Temperatures (°C.).					B. T. U.	
															Water.					
					1	2			Volts.	Amperes.		Air entering (inches mercury).	Gas leaving (inches water)	Gas.	Inlet.	Outlet.	Cubic centimeters of water collected.	Cubic feet of gas.	As read.	Standardized.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
5:40 p. m.	....	8 750,850	67.0	....	2.4	1.0	809,150	34,927	240	624	380	....	....	16.0	4.8	13.5	900	.2	155.1	155.9
6:00 p. m.	300	8,756,380	65.5	....	2.4	.8	....	36,947	240	624	....	....	....	16.0	4.8	12.8	850	.2	134.9	135.6
6:20 p. m.	....	8,761,950	65.0	....	2.4	.8	....	38,970	240	624	....	.6	5.5	16.0	4.8	14.0	810	.2	147.6	148.4
6:40 p. m.	....	8,767,330	65.0	....	2.4	1.0	812,020	40,997	241	624	400	....	....	16.0	4.6	13.5	840	.2	148.0	148.8
7:00 p. m.	300	8,772,670	65.0	....	2.4	1.0	....	43,017	241	624	....	....	....	....	....	.....	.....	....	.....	.....
7:20 p. m.[c]	....	8,777,950	65.0	....	2.4	1.0	....	45,067	240	629	....	.6	5.5	....	....	.....	.....	....	.....	.....
7:40 p. m.	....	8,783,150	64.5	....	2.4	1.0	814,400	47,093	241	629	340	....	....	15.0	4.7	11.9	1,100	.2	157.1	157.4
8:00 p. m.	300	8 788,900	64.5	....	2.3	.6	....	49,138	241	624	....	....	....	16.0	4.8	12.3	1,060	.2	157.5	158.3
8:20 p. m.	....	8,794,400	64.5	....	2.3	.6	....	51,159	240	624	....	....	....	16.0	4.8	12.2	1,010	.2	149.6	150.4
8:40 p. m.	....	8,799,450	64.5	....	2.3	.5	816,200	53,188	238	624	350	....	....	16.0	5.0	14.5	790	.2	148.8	149.6
9:00 p. m.	300	8,804,200	64.5	....	2.3	.5	....	55,208	240	624	....	....	....	16.0	4.9	14.8	750	.2	147.2	148.0
9:20 p. m.	....	8,809.650	65.0	....	2.3	.5	....	57,235	239	624	....	....	....	16.4	5.0	14.6	800	.2	146.5	147.5
9:40 p. m.	....	8,815,000	66.0	....	2.3	.5	819,100	59,262	239	629	440	.6	5.5	16.5	5.1	14.5	770	.2	143.2	144.2
10:00 p. m.	....	8,820,300	66.5	....	2.3	.4	....	61,290	240	624	....	....	....	16.8	5.2	14.6	750	.2	139.7	140.8
10:15 p. m.	300	....	....	....	....	....	....	......	....	....	....	....	....	....	....	.....	.....	....	.....	.....
10:20 p. m.	....	8,825 650	67.0	....	2.3	.4	....	63,319	237	629	....	....	....	16.5	5.0	14.55	830	.2	157.1	158.3
10:40 p. m.	....	8,831,000	66.5	....	2.3	.4	822,000	65,348	240	624	340	.5	4.5	16.5	5.2	14.5	850	.2	156.7	157.9
11:00 p. m.	....	8,836,190	66.5	....	2.3	.4	....	67,381	240	624	....	....	....	17.0	5.3	14.8	800	.2	150.7	152.1
11:20 p. m.	....	8,841,400	67.0	....	2.4	.5	....	69,419	238	624	....	....	....	17.2	5.3	14.6	820	.2	151.2	152.6
11:30 p. m.	300	....	....	....	....	....	....	......	....	....	....	....	....	....	....	.....	.....	....	.....	.....
11:40 p. m.	....	8,846,720	67.0	....	2.3	.2	824,920	71,457	240	624	340	....	....	17.5	5.3	14.5	850	.2	155.1	156.7
12:00 p. m.	....	8,852,000	66.0	....	2.4	.5	....	73,495	242	624	....	....	....	....	....	.....	.....	....	.....	.....
12:20 a. m.[d]	....	....	....	....	....	....	....	......	....	....	....	....	....	15.5	5.0	15.6	780	.2	154.8	155.3

[c] At 7:30 p. m. load was thrown off for five minutes as the engine was back firing badly. This was repeated at 8:45 p. m.

[d] At 12:10 a. m. the igniters were working badly and the engine stopped.

GAS ANALYSES.

Time.	CO_2.	O_2.	CO.	H_2.	CH_4.	N.	Total.	B.T.U.
11:40 a. m.	10.2	0.0	10.2	5.8	6.8	67.4	100.0	123.8
2:05 p. m.	10.6	.2	11.6	13.5	6.2	57.9	100.0	152.6
4:05 p. m.	10.6	.8	11.8	13.4	6.0	57.4	100.0	151.5
6:05 p. m.	11.0	.2	13.0	10.0	6.1	59.7	100.0	145.1
8:05 p. m.	10.8	.0	13.8	9.0	6.8	59.6	100.0	152.9
10:25 p. m.	10.0	.4	13.6	10.1	6.4	59.5	100.0	151.0

Producer-gas test No. 17A, West Virginia No. 9 (from Mine No. 58 on Map II) was recorded by W. C. Weidmann, Kurt Toensfeldt, and R. E. Peshak, December 19, 1904, as given on page 1272 of Professional Paper No. 48 of the U. S. Geological Survey. The detailed tests of No. 17A, No. 17B, and No. 21, as summarized in Bulletin 13, pages 276, 282, 288, 294, 300, 306, and 312, of the U. S. Bureau of Mines, are given after the full-page tables, etc., taken from Professional Paper No. 48 above mentioned. No. 17B was recorded by Messrs. Weidmann and Toensfeldt on the above date, while No. 21 was recorded by the same parties on January 27, 1905. The following remarks are taken from page 1275 of Professional Paper No. 48:

> "The West Virginia No. 9 is a rich bituminous coal. It burned well and was easily handled in the producer, yielding a gas of uniformly good quality. It makes a good producer fuel.
>
> "From 11:40 a. m. to 5 p. m. (designated as test No. 17A), the load was 500 amperes. At 5:20 p. m. the engine was shut down in order to change the ignition setting, and at 5:40 p. m. the test resumed, the engine carrying full load (600 amperes). At 12:10 a. m. the engine stopped on account of a ground in the igniter circuit. Test No. 17B includes the portion of the run from 5:40 p. m. to 12 midnight.
>
> "One hundred and twenty gallons of black tar were extracted."

Log of producer-gas test No. 21, West Virginia No. 9 coal, January 27, 28, 1905.

[Coal from Vulcan mine of the Mount Carbon Coal Company (Limited), Powellton, W. Va.)]

Time.	Coal consumed by producer (pounds).	Gas meter (cubic feet).	Temperature of gas (°F.).	Water meter (cubic feet).	Manometers at gas meter (inches water) 1	Manometers at gas meter (inches water) 2	Auxiliary motors. Watt meter	Speed counters on gas engine.	Load. Volts.	Load. Amperes	Temperature of gas leaving producer (°C.)	Manometers at producer. Air entering (inches mercury).	Manometers at producer. Gas leaving (inches water).	Gas calorimeter. Temperatures (°C.). Gas.	Gas calorimeter. Temperatures (°C.). Water. Inlet.	Gas calorimeter. Temperatures (°C.). Water. Outlet.	Gas calorimeter. Cubic centimeters of water collected.	Gas calorimeter. Cubic feet of gas.	Gas calorimeter. B. T. U. As read.	Gas calorimeter. B. T. U. Standardized.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
1:00 p. m.[a]	300	572,200	70	......	2.0	−0.2	37,200	0,000	240	619	650	....	....	80	4.5	13.3	870	0.2	151.6	157.0
1:20 p. m.	....	579,230	70	36,906	2.2	+.4	......	1,921	242	604	690	....	....	79	4.5	13.4	820	.2	144.4	149.1
1:40 p. m.	....	586,200	70	......	2.2	.3	......	3,940	240	614	700	....	....	78	4.4	13.4	870	.2	155.1	160.1
1:45 p. m.	300	....	....	......	....	....	......	......	....	....	....	....	....	....	....	.....	.....	....	.....	.....
2:00 p. m.	....	592,990	70	......	2.2	.0	39,120	5,954	242	575	620	0.8	8.0	78	4.4	14.4	760	.2	150.8	155.7
2:20 p. m.	....	599,720	70	......	2.2	.5	......	7,957	238	624	710	....	....	75	4.4	13.1	870	.2	149.9	153.7
2:40 p. m.	....	606,790	70	......	2.2	.5	......	9,967	240	619	700	....	....	....	....	.....	.....	....	.....	(b)
3:00 p. m.	300	613,450	70	......	2.2	.4	40,920	11,980	238	639	720	....	....	73	4.5	12.9	880	.2	146.4	149.6
3:20 p. m.	....	620,310	70	37,224	2.2	1.0	......	13,992	244	624	560	....	....	72	4.5	13.9	830	.2	154.8	158.0
3:40 p. m.	....	626,400	70	......	2.2	1.0	......	16,017	244	609	590	....	....	71	4.5	15.0	760	.2	158.3	161.3
4:00 p. m.	....	632,270	71	......	2.3	.8	42,820	18,037	235	624	640	.5	4.5	70	4.5	13.6	860	.2	155.1	157.7
4:20 p. m.	....	638,280	71	......	2.3	.8	......	20,058	237	629	620	....	....	70	4.5	14.1	820	.2	155.9	158.5
4:30 p. m.	300	....	....	......	....	....	......	......	....	....	....	....	....	....	....	.....	.....	....	.....	.....
4:40 p. m.	....	644,170	71	......	2.4	1.1	......	22,032	239	609	510	....	....	70	4.5	15.5	760	.2	165.1	167.8
5:00 p. m.	....	650,860	70	......	2.3	1.0	44,700	24,126	238	624	570	.5	5.5	70	4.5	15.2	760	.2	161.1	163.7
5:20 p. m.	....	655,570	70	37,550	2.4	1.0	......	26,154	237	624	580	....	....	69	4.5	14.6	810	.2	162.3	164.7
5:40 p. m.	....	661,350	70	......	2.4	.9	......	28,176	237	634	610	....	....	68	4.5	14.0	880	.2	165.9	167.9
5:45 p. m.	300	....	....	......	....	....	......	......	....	....	....	....	....	....	....	.....	.....	....	.....	.....
6:00 p. m.	....	667,090	69	......	2.4	1.2	46,500	30,211	237	624	500	.4	4.5	67	4.4	15.1	770	.2	163.1	164.8
6:20 p. m.	....	....	69	......	2.4	1.2	......	32,246	238	619	540	....	....	66	4.5	14.8	800	.2	163.5	165.1
6:40 p. m.	....	678,110	69	......	2.4	1.2	......	34,269	238	619	550	....	....	65	4.4	14.0	880	.2	167.4	168.4
6:50 p. m.	300	....	....	......	....	....	......	......	....	....	....	....	....	....	....	.....	.....	....	.....	.....
7:00 p. m.	....	683,600	69	......	2.4	1.2	48,100	36,300	238	624	500	.6	6.0	64	4.4	13.7	920	.2	169.8	170.7
7:20 p. m.	....	689,200	69	......	2.4	1.2	......	38,320	238	624	550	....	....	63	4.4	14.2	800	.2	155.5	156.0
7:40 p. m.	....	694,850	69	......	2.4	1.2	......	40,340	239	624	590	....	....	63	4.4	14.1	830	.2	159.5	159.9
7:45 p. m.	300	....	....	......	....	....	......	......	....	....	....	....	....	....	....	.....	.....	....	.....	.....
8:00 p. m.	....	700,780	68	......	2.4	1.1	50,280	42,358	240	629	520	....	....	63	4.4	14.6	780	.2	157.9	158.4

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[a] January 27. Average barometer for entire test, 29.81 inches. Producer hopper leaked badly.

[b] Calorimeter reading missed on account of interference of workmen.

Log of producer-gas test No. 21, West Virginia No. 9 coal, January 27, 28, 1905.—Continued.

[Coal from Vulcan mine of the Mount Carbon Coal Company (Limited), Powellton, W. Va.]

Time.	Coal consumed by producer (pounds).	Gas meter (cubic feet).	Temperature of gas (°F.).	Water meter (cubic feet).	Manometers at gas meter (inches water).		Auxiliary motors. Watt meter.	Speed counts load on gas engine.			Temperature of gas leaving producer (°C.).	Manometers at producer.		Gas calorimeter.						
														Temperatures (°C.).					B. T. U.	
															Water.					
					1	2			Volts.	Amperes.		Air entering (inches mercury).	Gas leaving (inches water).	Gas.	Inlet.	Outlet.	Cubic centimeters of water collected.	Cubic feet of gas.	As read.	Standardized.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
8:20 p. m.	....	706,500	68	......	2.4	1.1	......	44,382	240	624	550	....	....	63	4.5	14.5	800	.2	158.7	159.2
8:40 p. m.	300	712,150	68	......	2.4	1.1	......	46,412	241	624	500	.4	5.0	63	4.4	14.7	780	.2	159.5	160.0
9:00 p. m.	....	717,700	69	......	2.4	1.2	52,200	48,436	241	624	520	....	....	62	4.5	15.0	780	.2	162.2	162.3
9:20 p. m.	....	723,150	69	......	2.4	1.2	......	50,474	240	614	550	....	....	63	4.5	14.8	800	.2	163.5	164.0
9:40 p. m.	300	728,850	69	......	2.4	1.1	......	52,496	239	624	560	....	....	64	4.5	14.0	860	.2	161.9	162.7
10:00 p. m.	....	734,550	69	......	2.4	1.1	54,100	54,527	242	604	500	....	....	63	4.5	14.6	820	.2	164.3	164.8
10:20 p. m.	....	740,000	69	......	2.4	1.0	......	56,559	240	624	540	.5	6.0	62	4.4	14.2	840	.2	159.5	159.7
10:40 p. m.	300	745,950	69	......	2.4	1.0	......	58,585	240	624	560	....	....	62	4.4	13.9	850	.2	160.3	160.5
11:00 p. m.	....	751,600	70	......	2.4	1.0	56,100	60,616	240	624	540	....	....	64	4.5	14.8	830	.2	169.4	170.3
11:20 p. m.	....	757,250	70	......	2.4	1.1	......	62,646	240	614	560	....	....	65	4.5	14.9	830	.2	171.0	172.0
11:40 p. m.	300	762,800	70	......	2.4	1.0	......	64,680	238	624	570	....	....	64	4.5	15.2	760	.2	161.5	162.3
12:00 p. m.	....	768,600	70	......	2.4	1.1	58,040	66,709	240	614	520	.4	4.5	65	4.5	15.8	730	.2	163.5	164.5
12:20 p. m.[a]	....	774,210	70	......	2.4	1.1	......	68,743	240	619	540	....	....	65	4.5	16.2	730	.2	169.4	170.5
12:40 p. m.	....	779,870	70	......	2.4	1.1	......	70,777	238	624	560	....	....	66	4.5	16.0	720	.2	164.3	165.5
1:00 a. m.	300	785,640	70	......	2.4	1.0	59,910	72,806	238	629	570	....	....	66	4.5	15.6	750	.2	165.0	166.8
1:20 a. m.	....	791,380	70	38,875	2.4	1.0	......	74,837	239	614	560	....	....	66	4.5	15.7	730	.2	161.9	163.8
1:40 a. m.	....	797,150	70	......	2.4	1.0	......	76,867	239	614	610	....	....	66	4.5	16.0	720	.2	164.3	165.2
2:00 a. m.	300	802,950	70	......	2.4	1.0	61,920	78,895	238	624	600	.5	5.5	66	4.6	15.7	720	.2	158.7	160.2
2:20 a. m.	....	808,670	70	......	2.4	1.1	......	80,929	239	624	520	....	....	66	4.6	16.4	700	.2	163.9	165.3
2:40 a. m.	....	814,380	70	......	2.4	1.0	......	82,960	240	624	560	....	....	66	4.5	16.0	710	.2	161.9	163.4
3:00 a. m.	300	820,200	70	......	2.4	1.0	63,880	84,993	240	624	520	....	....	66	4.5	16.0	700	.2	159.5	161.0
3:20 a. m.	....	825,750	70	39,215	2.4	1.1	......	87,027	241	609	530	....	....	66	4.6	16.4	700	.2	163.9	165.4
3:40 a. m.	....	831,300	70	......	2.4	1.1	......	89,059	241	594	550	....	....	65	4.5	15.9	720	.2	162.7	163.7
4:00 a. m.	....	837,190	69	......	2.4	.8	65,690	91,088	239	614	580	....	....	64	4.5	15.2	730	.2	154.8	155.2
4:20 a. m.	....	843,190	69	......	2.4	.7	......	93,109	238	624	600	....	....	65	4.5	14.5	750	.2	148.8	149.8
4:30 a. m.	300	......	....	......	....	....	......	......	....	....	....	....	....	....	....	....	......	....	......	.....
4:40 a. m.	....	849,390	69	......	2.4	1.0	......	95,130	240	604	540	....	....	64	4.5	15.4	700	.2	151.2	151.9

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[a] January 28.

Log of producer-gas test No. 21, West Virginia No. 9 coal, January 27, 28, 1905—Concluded.

[Coal from Vulcan mine of the Mount Carbon Coal Companw (Limited), Powellton, W. Va.]

Time.	Coal consumed by producer (pounds).	Gas meter (cubic feet).	Temperature of gas (°F.).	Water meter (cubic feet).	Manometers at gas meter (inches water)		Auxiliary motors. Watt meter	Speed counters on gas engine.	Load.		Temperature of gas leaving producer (°C.)	Manometers at producer.		Gas calorimeter.						
					1	2			Volts.	Amperes		Air entering (inches mercury).	Gas leaving (inches water).	Temperatures (°C.).			Cubic centimeters of water collected.	Cubic feet of gas.	B. T. U.	
														Gas.	Water.				As read.	Standardized.
															Inlet.	Outlet.				
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
5:00 a. m.	....	855,350	68	......	2.4	1.0	67,610	97,155	242	619	580	....	....	64	4.5	15.3	720	.2	154.3	155.1
5:20 a. m.	....	861,310	68	39,535	2.4	1.0	......	99,195	240	624	610	....	....	64	4.5	15.0	720	.2	150.0	150.8
5:30 a. m.	300	....	....	......	....	....	......	....	....	....	....	....	....	....	....	.....	.....	....	.....	.....
5:40 a. m.	....	867,880	68	......	2.4	1.0	......	101,201	242	619	580	....	....	64	4.5	15.5	710	.2	153.5	154.3
6:00 a. m.	....	873,300	68	......	2.4	1.0	69,520	103,230	242	585	610	....	....	64	4.5	15.6	700	.2	153.9	154.8
6:20 a. m.	....	879,250	68	......	2.4	1.0	......	105,255	240	624	630	....	....	64	4.5	14.9	740	.2	152.7	153.5
6:40 a. m.	....	885,390	67	......	2.4	1.0	......	107,264	240	624	600	....	....	64	4.5	13.2	860	.2	148.4	149.2
6:45 a. m.	300	....	....	......	....	....	......	....	....	....	....	....	....	....	....	.....	.....	....	.....	.....
7:00 a. m.	....	891,540	67	......	2.4	1.0	71,560	109,287	240	624	610	....	....	64	4.5	16.2	720	.2	167.0	167.8
7:20 a. m.	....	897,320	67	39,873	2.4	1.0	......	111,316	242	604	640	....	....	65	4.5	15.8	730	.2	163.5	164.5
7:40 a. m.	....	903 300	67	......	2.4	1.0	......	113,340	240	624	620	....	....	65	4.5	14.7	760	.2	153.9	154.8
8:00 a. m.	300	909,260	67	......	2.4	1.0	73,470	115,361	242	629	600	....	....	65	4.5	15.0	760	.2	159.9	160.9
8:20 a. m.	....	915,100	67	......	2.4	1.0	......	117,389	240	629	530	....	....	66	4.4	15.4	720	.2	157.1	158.6
8:40 a. m.	....	920 740	67	......	2.4	1.0	......	119,417	242	624	....	....	....	65	4.4	15.8	720	.2	162.7	163.7
9:00 a. m.	....	926,000	68	......	2.4	1.0	75,400	121,442	241	624	550	....	....	63	4.4	15.7	720	.2	161.9	162.6
9:20 a. m.	....	931,650	69	40,205	2.4	1.0	......	123,470	241	624	580	....	....	63	4.4	15.4	700	.2	152.8	153.5
9:40 a. m.	300	937,500	69	......	2.4	1.0	......	125,495	242	624	540	....	....	62	4.4	14.8	710	.2	146.4	146.6
10:00 a. m.	....	943,100	69	......	2.4	1.0	77,300	127,530	242	624	530	....	....	61	4.4	15.6	740	.2	164.3	164.3
10:20 a. m.	....	948,600	69	......	2.4	1.0	......	129,555	240	624	550	....	....	61	4.5	15.5	720	.2	155.1	155.1
10:40 a. m.	....	954,000	69	......	2.4	1.1	......	131,575	214	624	550	....	....	61	4.4	15.0	750	.2	172.6	172.6
11:00 a. m.	....	959,750	69	......	2.4	1.0	79,200	133,605	241	624	....	.4	5.0	61	4.4	14.7	730	.2	148.8	148.8
11:20 a. m.	....	965,950	70	40,538	2.4	1.0	......	135,636	240	624	580	....	....	65	4.5	14.0	780	.2	156.7	157.7
11:30 a. m.	300	....	....	......	....	....	......	....	....	....	....	....	....	....	....	.....	.....	....	.....	.....
11:40 a. m.	....	971,450	70	......	2.4	1.1	......	137,663	242	624	500	....	....	66	4.4	16.1	710	.2	164.7	166.3
12:00 m.	....	976,700	70	......	2.4	1.1	81,200	139,698	242	624	510	....	....	65	4.4	16.4	710	.2	173.0	174.0
12:20 p. m.	....	982,600	71	......	2.4	1.1	......	141,733	241	624	510	....	....	65	4.4	16.0	700	.2	161.1	162.1
12:40 p. m.	....	988,250	71	......	2.4	1.1	......	143,760	241	624	560	....	....	68	4.5	15.9	700	.2	158.3	160.3
1:00 p. m.	....	993,900	71	40,820	2.4	1.1	83,100	145,790	241	624	550	....	....	68	4.6	15.6	720	.2	157.1	159.1

GAS ANALYSES.

Time.	CO_2.	O_2.	CO.	H_2.	CH_4.	N.	Total.	B.T.U.
1:10 p. m.[a]........	9.8	0.0	12.6	10.0	5.0	62.6	100.0	142.2
3:10 p. m..........	10.6	.4	12.6	9.8	6.1	60.5	100.0	143.0
5:10 p. m..........	9.2	.0	16.0	9.3	6.6	58.9	100.0	158.5
7:10 p. m..........	9.2	.2	16.0	11.3	6.0	57.3	100.0	159.1
9:10 p. m..........	9.0	.2	14.6	11.9	6.7	57.6	100.0	163.7
11:10 p. m..........	9.0	.0	14.0	11.0	7.1	58.9	100.0	162.8
1:10 a. m.[b]........	8.8	.4	15.6	10.5	6.0	58.7	100.0	154.9
3:10 a. m..........	8.4	.4	16.8	8.7	7.7	58.0	100.0	170.9
5:10 p. m..........	9.0	.4	14.6	9.4	6.1	60.5	100.0	148.6
7:10 a. m..........	8.4	.0	14.8	8.3	8.0	60.5	100.0	165.7
9:10 a. m..........	8.4	1.4	15.8	9.5	5.7	59.2	100.0	148.9
11:10 a. m..........	7.0	.6	13.8	4.4	8.8	65.4	100.0	156.2

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[a] January 27.

[b] January 28.

"**West Virginia No. 9, tests 17A and 17B (Mine No. 58 on Map II).**—West Virginia No. 9 was a high-grade bituminous coal. It burned well and was easily handled in the producer, yielding a gas of uniformly good quality. It made a good producer fuel. One hundred and twenty gallons of black tar were extracted.

"**West Virginia No. 9, test 21. (Mine No. 58 on Map II.)**—This test was the second run on West Virginia No. 9. The coal worked satisfactorily in the producer and gave good results. Fifty gallons of black tar were extracted.

	Test 17A	Test 17B	Test 21
Designation of fuel......................	No. 9	No. 9	No. 9
Origin of fuel sample:			
Name of bed..........................	Powellton	Powellton	Powellton
Location of mine or deposit............	Powellton	Powellton	Powellton
Duration of test (hours)..................	5⅓	6⅓	24
Size of fuel:			
As shipped..........................	Run of mine	Run of mine	Run of mine
Proximate analysis of fuel as fired (per cent.)			
Moisture	2.66	2.66	2.22
Volatile matter........................	32.00	32.00	31.05
Fixed carbon..........................	59.61	59.61	59.83
Ash	5.73	5.73	6.90
Sulphur (separately determined)........	1.00	1.00	.79
Total fuel charged in producer (pounds):			
As fired	1,300	1,900	6,000
Dry	1,265	1,848	5,867
Combustible	1,191	1,739	5,453
Refuse (determined from analysis)......	74	109	414
Fuel charged per hour (pounds):			
In producer—			
As fired..........................	244.0	300.0	250.0
Dry	237.5	292.0	244.5
Combustible	223.5	274.9	227.0
In producer plant			
As fired..........................	273.9	328.9	284.8
Dry	265.6	320.1	278.5
Combustible	250.0	301.4	258.6
Per square foot of fuel-bed area—			
As fired..........................	6.34	7.80	6.50
Dry	6.18	7.60	6.36
Combustible	5.81	7.15	5.90
Calorific value (British Thermal Units):			
Fuel—			
Per pound—			
As fired...	14,195	14,195	14.224
Dry	14,580	14,580	14,548
Combustible	15,500	15,500	15,650
Per hour as fired	3,465,000	4,260,000	3,555,000

	Test 17A	Test 17B	Test 21
Standard gas (at 62°F. and 14.7 pounds pressure)—			
Per pound of fuel—			
As fired	9,750	7,945	11,125
Dry	10,000	8,150	11,380
Per cubic foot	150.0	151.0	160.5
Per brake horse-power hour	12,000	10,060	10,860
British Thermal Units equivalent to stated horse-power per minute:			
Gas	39,600	39,640	46,300
Indicated	10,735	11,960	11,485
Brake	8,395	10,025	9,940
Electrical	7,135	8,525	8,450
Production of gas (cubic feet):			
Meter per hour	15,920	15,980	17,570
Standard gas (at 62°F. and 14.7 pounds pressure)—			
Total	83,937	99,781	415,660
Per hour	15,750	15,770	17,330
Per pound of fuel charged—			
In producer—			
As fired	64.6	52.6	69.3
Dry	66.3	54.0	70.9
Combustible	70.4	57.4	76.3
Total used by producer plant—			
As fired	57.6	48.0	60.9
Dry	50.3	49.3	62.2
Combusticle	63.0	52.3	67.0
Standard gas consumed per horse-power hour (cubic feet):			
Indicated	62.2	55.8	63.9
Brake	79.5	66.6	73.9
Electrical	93.6	78.4	86.9
Composition of gas (per cent. of volume):			
CO_2	10.47	10.40	8.90
O_2	.33	.20	.33
C_2H_4	.00	.00	.00
CO	11.20	13.70	14.77
H_2	10.90	9.45	9.52
CH_4	6.20	6.60	6.65
N_2	60.90	59.55	59.83
Gas horse-power	934	935	1,092
Revolutions per minute of gas engine	202.5	203.0	202.5
Explosions per minute per cylinder	101.3	101.5	101.3
Indicated horse-power:			
Indicator card pressures (pounds per square inch)—			
Maximum—			
Cylinder 1	210.0	305.0	255.0
Cylinder 2	220.0	261.0	235.0
Cylinder 3	220.0	212.0	255.0
At release—			
Cylinder 1	25.7	30.0	27.0
Cylinder 2	27.3	30.5	25.0
Cylinder 3	23.9	27.2	23.0
Mean effective pressure—			
Cylinder 1	54.0	62.5	59.8
Cylinder 2	56.3	61.4	61.0
Cylinder 3	48.3	52.8	49.8
Cylinder 1	86.2	99.8	95.0
Cylinder 2	89.9	98.2	96.9
Cylinder 3	77.1	84.2	79.1
Total	253.2	282.2	271.0
Brake horse-power:			
Developed at engine	198.0	236.5	234.4
Commercially available	181.4	220.0	222.4
Electrical horse-power:			
Developed at switchboard	168.3	201.0	199.3
Commercially available	181.4	220.0	222.4

	Test 17A	Test 17B	Test 21
Economic results: Fuel charged in producer per horse-power hour (pounds):			
Per brake horse-power—			
Developed at engine—			
As fired	1.35	1.27	1.07
Dry	1.31	1.24	1.04
Combustible	1.23	1.16	.97
Commercially available—			
As fired	1.23	1.36	1.18
Dry	1.20	1.33	1.10
Combustible	1.13	1.25	1.02
Per electrical horse-power—			
Developed at switchboard—			
As fired	1.45	1.49	1.26
Dry	1.41	1.46	1.23
Combustible	1.33	1.37	1.14
Commercially available—			
As fired	1.58	1.60	1.32
Dry	1.54	1.56	1.29
Combustible	1.45	1.47	1.20
Economic results: Total fuel used by producer plant per horse-power hour (pounds):			
Per brake horse-power—			
Developed at engine—			
As fired	1.38	1.39	1.21
Dry	1.34	1.35	1.19
Combustible	1.26	1.27	1.10
Commercially available—			
As fired	1.51	1.49	1.28
Dry	1.47	1.46	1.25
Combustible	1.38	1.37	1.16
Per electrical horse-power—			
Developed at switchboard—			
As fired	1.62	1.64	1.43
Dry	1.58	1.59	1.40
Combustible	1.49	1.50	1.36
Commercially available—			
As fired	1.77	1.76	1.51
Dry	1.72	1.71	1.47
Combustible	1.62	1.61	1.37
Auxiliary power used by producer plant:			
To drive tar extractor (E. H. P.)	14.2	14.1	10.3
Used by producer (pounds)—			
Steam—			
Total	1,253	1.253	6,795
Per hour	236	236	283
Fuel equivalent of steam per hour—			
As fired	28.9	28.9	34.8
Dry	28.1	28.1	34.0
Combustible	26.5	26.5	31.6
Efficiency (per cent.):			
Of conversion and cleaning gas	68.6	55.8	78.2
Of producer plant	60.8	50.6	68.2
Thermal, based on stated horse-power and gas horse-power:			
Brake	21.2	....	21.5
Electrical	18.0	....	18.2
Of entire plant, based on E. H. P. commercially available and fuel consumed	10.1	10.2	11.9

The following results of washing tests are from pages 72-3 of Bulletin 261 of the U. S. G. Survey, and page 1473 of Prof. Paper 48:

WASHING TESTS.

"West Virginia No. 9 (Mine No. 58 on Map II)—Run-of-mine coal from Vulcan Mine, Mount Carbon Company (Limited), Powellton, W. Va.

"This coal was tested in the coke ovens in both the raw and the washed condition. The charge of raw coal contained about 4½ tons and of washed coal about 6 tons. The coke from the washed coal showed much improvement over that from the unwashed coal. The change in composition is shown by the following analyses:

ANALYSES SHOWING EFFECT OF WASHING COAL.

	Coal.		Coke.	
	Raw.	Washed.	From Raw Coal.	From Washed Coal.
Ash	8.07	4.51	9.15	7.38
Sulphur	0.83	0.90	0.82	0.77

The following results of coking tests of coal from **Mine No. 58 on II** are taken from pages 128, 132-3 of Bulletin 261 of the U. S. G. Survey and pages 1363-4 of Prof. Paper 48 of the same Survey:

COKING TESTS.

"Two tests were made on this coal, the first being unwashed, the second washed. The unwashed charge weighed 10,000 pounds, and was burned 40 hours. It yielded 6,084 pounds, or 60.8 per cent., of coke, and 314 pounds of breeze and ash. The coke was heavy and grayish in color. It was of good quality, though slightly brittle. The coke from the washed coal showed much improvement over that from the unwashed coal, and could be considered a high-grade coke. The charge of washed coal weighed 11,000 pounds, burned for 66 hours, and yielded 6,803 pounds, or 61.8 per cent., of coke, and only 78 pounds of ash and breeze."

ANALYSIS OF COAL.

	Unwashed* Lab. No. 1489.	Washed** Lab. No. 1510.
Moisture	3.81	5.74
Volatile Matter	31.08	32.14
Fixed Carbon	57.04	57.61
Ash	8.07	4.51
Sulphur	0.83	0.90

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*Used in coking test No. 50.

**Used in coking test No. 53.

COKING TEST AND COKE PRODUCTION.

	Coke Test No. 50. (Unwashed)	Coke Test No. 53. (Washed)
Time in oven (hours)	48	66
Coal charged, wet (pounds)	.....	11,000
Coal charged, dry (pounds)	8,000	.....
Large coke (pounds)	3,989	5,023
Medium coke (pounds)	2,095	1,780
Total coke made (pounds)	6,084	6,803
Breeze and ash (pounds)	314	78
Per cent of yield:		
Large	49.8	45.6
Medium	26.2	16.2
Total	76.0	61.8
Breeze and ash	3.9	0.7

PHYSICAL AND CHEMICAL PROPERTIES OF COKE PRODUCED.

	Test No. 50.	Test No. 53.
Grams in 1 cubic inch, dry	18.8	15.1
Grams in 1 cubic inch, wet	23.68	22.46
Pounds in 1 cubic foot, dry	71.44	57.38
Pounds in 1 cubic foot, wet	89.98	85.34
Percentage by volume, coke	64	55
Percentage by volume, cells	36	45
Compressive strength per cubic inch (one-fourth ultimate strength) (pounds)	227	360
Height of furnace charge supported without crushing (feet)	91	145
Hardness	2.8	2.9
Specific gravity	1.84	1.87
Chemical analysis (per cent.):		
Moisture	0.29	0.27
Volatile Matter	2.41	0.62
Fixed Carbon	88.15	91.73
Ash	9.15	7.38
Sulphur	0.82	0.77
Phosphorus	0.0094	0.012

"A heavy coke of gray color and slightly brittle was the product from this coal. In ash, sulphur, and phosphorus it is equal to the best Connellsville coke, with which it compares well in burden-bearing qualities, though it is slightly softer. The very low percentage of cells makes this coke very dense. By washing this coal the ash and sulphur showed a further reduction, the coke was harder, the cell structure was improved, and it will carry a heavier burden. The washed coal produced a coke which is much superior to that made from the unwashed coal and which stands rough handling well."

Mount Carbon Co., Ltd., South Vulcan Mine—No. 59 on Map II.

On head of Powellton Fork, ⅛ mile east of mouth of Woodrum Branch; **Powellton (Brownstown) Coal**; elevation, 1615′ B.; examined by author.

			Feet.	Inches.
Sandstone, visible, **Brownstown**			10	0
Shale, buff, sandy			9	0
Coal, gas, medium-hard	0′	8″		
Slate, black, ½″ to	0	1		
Coal, medium-soft, columnar	2	0		
Slate, hard, dark-gray	0	4		
Coal, soft, columnar	3	0	6	1
Slate, gray, pavement				

This mine has been in operation for about 9 years.

M. B. Coal Co. Elk Ridge No. 1 Mine—No. 60 on Map II.

On east hillside of Armstrong Creek, at Elk Ridge; **Powellton (Brownstown) Coal**; elevation, 1445′ B.; for general stratigraphic position, see Elk Ridge Section; section measured at entrance by author.

				Feet.	Inches.
Sandstone, flaggy and shaly, visible				3	0
Shale, buff, sandy, iron ore nodules, plant fossils abundant				7	0
Coal, gas	0′	4″			
Shale, gray, dark	0	2			
Coal, gas	0	3			
Slate, gray, dark, ½″ to	0	1			
Coal, medium-soft, columnar	2	4			
Shale, gray	0	2			
Coal, splint	0	4			
Coal, gas	0	6			
Slate, gray, dark	0	2			
Coal, soft, columnar	2	3	**Powellton**	6	7
Slate, gray					

This mine has been carried southward until it connects up with Elk Ridge No. 2 (Mine No. 61 on Map II).

The author also measured a section at the above mine in 1907 when it was being operated by the Cardiff Coal Co. which was published by Dr. White on page 350 of Volume II(A) as follows:

					Feet.	Inches.
1.	Coal, soft, gas (exposed at crop),			No. 2 Gas	3	0
2.	Concealed and sandstone..................				95	0
3.	Slate, good roof, 2' to......................				3	0
4.	Coal, soft, gas........	0'	4"			
5.	Slate, black...........	0	1			
6.	Coal, gas..............	2	8			
7.	Bone, splint, sometimes	0	3½			
8.	Coal, gas..............	0	3½			
9.	Slate	0	1½			
10.	Coal, soft, 3" splint, 4" above base..........	2	7	Powellton..	6	4½
11.	Fire clay, etc............................					

"Butts, N. 80° E.; faces, S. 10° E.; greatest rise, S. 45° E.; mine capacity, 250 tons; men employed, 75; coal shipped east and west for steam and domestic purposes; sample from Nos. 6, 8, and 10, and also from No. 10 only, the analyses of which were published under Nos. 27 and 28, respectively, on page 348 of Volume II(A)."

"In the region of Powellton this No. 10 of the section is the only portion used in the manufacture of a high-grade coke. At the Elk Ridge Mine No. 1, in back entry 8, room 4, the coal is 5 feet 3 inches thick with only a knife edge parting, according to Mr. P. Kincaid, the Mine Foreman, who is authority for all of the mine data."

The analyses mentioned above were republished by Dr. White under Nos. 27 and 28 on page 258 of Bulletin 2 of the Survey, and are given under Mine No. 60 in Table I at the end of this Chapter.

M. B. Coal Co. Elk Ridge No. 2 Mine—No. 61 on Map II.

On east hillside of Armstrong Creek, 0.8 mile south of Mine No. 60; Powellton (Brownstown) Coal; elevation, 1515' B.; examined by author.

				Feet.	Inches.
Coal, gas (shale roof)..................	0'	5"			
Slate, 1" to..........................	0	2			
Coal	0	3			
Slate, ½" to	0	1			
Coal	2	0			
Slate, black and gray, ½" to..........	0	2			
Coal (slate floor).....................	3	2	...	6	3

The author also measured a section at the above mine in 1907, when it was operated by the Cardiff Coal Company, and the results were published by Dr. White on page 350 of Volume II(A) of the Survey, as follows:

			Feet.	Inches.
1. Sandstone				
2. Slate, bad roof, 2′ to			4	0
3. **Coal**, gas	0′	4″		
4. Slate, black, hard	0	1		
5. **Coal**, soft, gas	2	0		
6. Slate, sometimes bone, or splint	0	2		
7. **Coal**, soft, gas	0	0	6	7

"Butts, N. 80° E.; faces, S. 10° E.; greatest rise, S. 45° E.; mine capacity, 250 tons; men employed, 40; coal shipped east and west for steam and domestic purposes; sample from Nos. 5 and 7, the analysis of which was published under No. 26 in Table No. 3, pages 346 and 348 of Volume II(A). Mr. O. R. Nutter, the Mine Foreman, reports the presence of a soft gas coal, 3 feet 8 inches thick, at 90 to 100 feet above the Powellton bed, and this would be the No. 2 Gas, since the latter coal and the Eagle bed are separated by an interval of nearly 180 feet in this region."

The analysis mentioned above was republished by Dr. White under No. 26 on page 258 of Bulletin 2 of the Survey and is given under **Mine No. 61** in Table 1 at the end of this Chapter.

M. B. Coal Co. Opening—No. 350 on Map II.

On west hillside of Armstrong Creek, 0.2 mile northwest of mouth of Left Fork; **Powellton (Brownstown) Coal**; elevation, 1385′ B.; examined by author.

			Feet.	Inches.
Sandstone, visible, **Brownstown**			5	0
Shale, dark, sandy			1	6
Coal, gas	0′	5½″		
Slate, dark-gray	0	1½		
Coal, gas	0	3½		
Slate	0	0½		
Coal, gas, medium-hard	1	9		
Slate, gray, dark	0	2		
Coal, gas	0	10		
Slate, dark-gray, 4″ to	0	6		
Coal, gas, medium-soft	3	0	7	2
Slate				

The above opening was driven in 25 to 30 feet at the time of the author's visit in 1916. It had been opened and mined by a lumber company, but was not in operation when visited.

Mount Carbon Co., Ltd., Prospect—No. 351 on Map II.

On south side of branch of Johnson Fork, 1.8 miles S. 45° W. of Kincaid; **Powellton (Brownstown) Coal**; elevation, 1835′ B.; examined by author.

				Feet.	Inches.
Sandstone, coarse, gray and brown, plant fossil stems, visible				5	0
Shale, buff, sandy, plant fossils, 18″ to				2	0
Coal, soft, columnar	0′	6″			
Slate, black	0	1			
Coal, medium-soft	0	3			
Slate, black	0	0½			
Coal, soft, columnar	3	0			
Bony coal	0	2½			
Slate, gray	0	2			
Coal, medium-soft (slate floor)	1	0	...	5	3

The Mt. Carbon Co., Ltd., ran crop from Powellton region to this point.

Coal Exposure—No. 352 on Map II.

On west edge of hill road, head of Johnson Fork, 2.1 miles south of Kincaid; **Powellton (Brownstown) Coal**; elevation, 2075′ B.; see Head of Johnson Fork Section, page 163, for stratigraphic position.

				Feet.	Inches.
Sandstone, flaggy					
Shale, buff, sandy				6	10
Coal, soft	0′	7″			
Shale, gray	0	6			
Coal, slaty	0	3			
Coal, soft	2	5			
Coal, slaty	0	4			
Shale, dark-gray	0	8			
Coal, soft	2	9	**Powellton** ..	7	6
Shale, sandy				5	0

Paint Creek Colliery Co. (Abandoned) Mine—
No. 62 on Map II.

On east hillside of Paint Creek, 0.3 mile northeast of Hickory Camp; **Powellton (Brownstown) Coal**; elevation, 1430′ B.; section at fan-house by Teets.

				Feet.	Inches.
Slate, gray, full of iron nodules, visible				4	0
Coal, gas	2′	2″			
Slate, gray	0	3			
Coal, gas	1	5	...	3	9
Slate				2	0
Sandstone, massive, medium-grained, visible				10	0

Christian Colliery Co. No. 2 Mine—No. 62A on Map II.

On west hillside of Paint Creek, 0.6 mile due south of Hickory Camp; **Powellton (Brownstown) Coal**; elevation, 1495′ B.; examined by Teets.

			Feet.	Inches.
Coal, gas, (sandstone roof)	1′	4″		
Coal, splint	0	3		
Coal, gas (slate floor)	2	9	4	4

"This mine was established in 1911; principal office, Burnwell; shipped to Lakes; used for domestic and steam purposes; capacity, 1000 tons daily; output, 600 tons daily; 80 miners and 50 laborers employed; motor haulage; H. W. Seacrist, Assistant to Manager, authority for mine data."

The following information was secured by Mr. A. M. Hagan in 1918 concerning this mine:

			Feet.	Inches.
1. Slate roof				
2. **Coal**, hard	3′	7″		
3. **Coal**, soft	0	8	4	3
4. Shale, floor				

"Coal owned by Christian Colliery Co.; principal office, Charleston; daily capacity, 100 tons; daily output, 80 tons; 30 laborers and 8 miners employed; shipped west; sample No. 940H collected from Nos. 2 and 3 of section in main entry, 1000 feet from drift mouth; buts, S. 75° W.; faces, S. 15° E.; greatest rise, S. 25° E.; motor haulage; used for by-product purposes; authority for mine data, R. B. Whitaker, General Manager."

The analysis of this sample, as reported by Messrs. Hite and Krak, is given under **Mine No. 62A** in Table 1 at the end of this Chapter.

Eagle By-Products Coal Co. Mine—No. 61A on Map II.

On east hillside of Paint Creek, 0.4 mile northeast of Krebs; **Powellton (Brownstown) Coal**; elevation, 1715′ L.; section by C. E. Krebs.

	Feet.	Inches.
Coal, gas, (slate roof and floor)	3	5

Mr. Krebs sent the Survey a sample of the coal from the above opening for analysis, the results of which are given under **Mine No. 61A** in Table 1 at the end of this Chapter.

Mr. Krebs also sent the Survey a copy of an analysis of this coal made by F. C. Broeman, as follows:

	Per cent.
Moisture	1.19
Volatile Matter	29.31
Fixed Carbon	60.75
Ash	8.75
Total	100.00
Sulphur	0.69
B. T. U.	14,150

Milburn Coal Co. No. 2 Mine—No. 63 on Map II.

. On head of Skitter Creek, 1.8 miles S. 30° W. of Keeferton; **Powellton (Brownstown) Coal**; elevation, 1993′ L.; section as reported by Milburn Coal Co., to Teets; for stratigraphic position see Kingston —1.7 Miles West Section, page 165.

		Feet.	Inches.
Coal (slate roof)	1′ 6″		
Fire clay	0 1		
Coal	2 4		
Slate	0 5		
Coal	0 10	5	2

"Principal office, Milburn; used for by-product and domestic purposes; shipped west; coal leased from W. Va. Coal Land Co.; capacity, 1500 tons daily; output, 900 tons daily; 80 miners and 125 laborers employed; company was organized in 1913; electric haulage; D. H. Mornton, General Manager, authority for data. This information also includes that for Mine No. 82 on Map II, in the Eagle bed."

A. M. Hagan measured the following section at this mine in 1918:

		Feet.	Inches.
1. Shale, hard, roof			
2. **Coal**	1′ 2 ″		
3. Bone	0 2½		
4. **Coal**	2 8		
5. Slate parting	0 0½		
6. **Coal**, with blade-like parting about $\frac{1}{16}$″ thick	1 4	5	5
7. Shale, blue, floor			

The analysis of a sample (935H) collected by Mr. Hagan from Nos. 2, 3, 4, and 6 of section, as reported by Messrs. Hite and Krak, is given under **Mine No. 63** in Table 1 at the end of this Chapter. The mine was not in operation at the time of Mr. Hagan's visit. Thomas Green, Mine Foreman, reported the principal office of the company at Indianapolis, Ind.

Solvay Collieries Co. Westerly (No. 2) Mine—No. 64 on Map II.

On southwest hillside of Paint Creek, 0.9 mile S. 10° W. of Keeferton; **Powellton (Brownstown) Coal**; elevation, 2030′ B.; section measured in 1st Right Entry by Teets.

			Feet.	Inches.
Coal (slate roof)	0′	7″		
Slate	0	8		
Coal, gas	2	0		
Slate, black	0	6		
Coal, block (fire clay floor)	4	5	8	2

The following section was also measured by Teets in the 1st Right Heading:

			Feet.	Inches.
Coal, (slate roof)	0′	8″		
Slate, gray, and bone	0	8		
Coal, gas	2	0		
Slate, blue	0	8		
Coal	0	3		
Slate, blue	0	7		
Coal, gas (fire clay floor)	4	2	9	0

The following section was measured by Mr. A. M. Hagan in 1918 on Rib on Second Left, 1500 feet from mouth of mine:

			Feet.	Inches.
1. Slate roof				
2. **Coal**	0′	8″		
3. Slate	0	8		
4. **Coal**	2	2		
5. Slate	0	8		
6. **Coal**	4	0	8	2
7. Fire clay floor				

"Coal owned by Solvay Collieries Company; principal office, Syracuse, New York; headquarters, Huntington, W. Va.; daily capacity, 300 tons; daily output, none at present; 15 laborers and 30 miners employed; electric motor haulage; used for by-product purposes; shipped west; greatest rise, S. 55° E.; sample No. 934H collected from Nos. 4 and 6 of section; authority for mine data, P. H. Marting; started operation in 1913; Nos. 2 and 3 of section are not mined."

The analysis of the above-mentioned sample, as reported by Messrs. Hite and Krak, is given under **Mine No. 64** in Table 1 at the end of this Chapter.

Solvay Collieries Co. No. 6 Mine—No. 65 on Map II.

On head of Milburn Creek, 1.3 miles S. 25° W. of Kingston; **Powellton (Brownstown) Coal**; elevation, 2145′ B.; just being opened in 1916; section by Teets.

			Feet.	Inches.
Coal, (slate, hard, blue, roof)	1′	3″		
Slate	0	11		
Coal, bony	0	4		
Coal	2	0		
Slate	0	7		
Coal (slate roof)	2	9	7	10

The following section at this mine was measured in 1918 by A. M. Hagan:

				Feet.	Inches.
1.	Shale, hard				
2.	Slate			0	3
3.	**Coal**, hard	0′	5½″		
4.	Slate	0	0¼		
5.	**Coal**, hard	0	9½		
6.	Shale, blue	0	8		
7.	**Coal**, soft	2	5		
8.	Slate, soft	0	6½		
9.	**Coal**, brittle	3	2	8	0¾

The analysis of a sample (932H) collected from Nos. 3, 4, 5, 7, and 9 of section, as reported by Messrs. Hite and Krak, is given under **Mine No. 65** in Table 1 at the end of this Chapter.

Solvay Collieries Co. No. 7 Mine—No. 66 on Map II.

On head of Milburn Creek, 0.3 mile southeast of Mine No. 65; **Powellton (Brownstown) Coal**; elevation, 2165′ B.; section by Teets.

			Feet.	Inches.
Coal, (slate roof)	1′	2″		
Slate	0	10		
Bony coal	0	3		
Coal	2	0		
Slate	0	7		
Coal (slate floor)	2	8	7	6

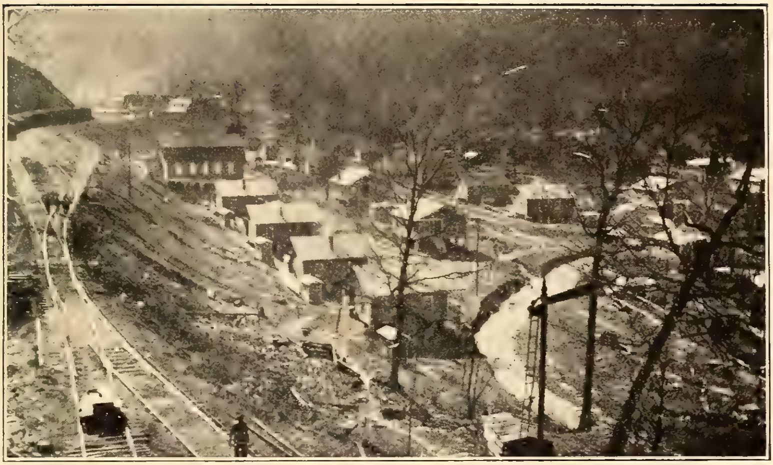

Photo by A. M. Hagan.

PLATE XX(a).—View of the coal mining town of Kingston, looking south.

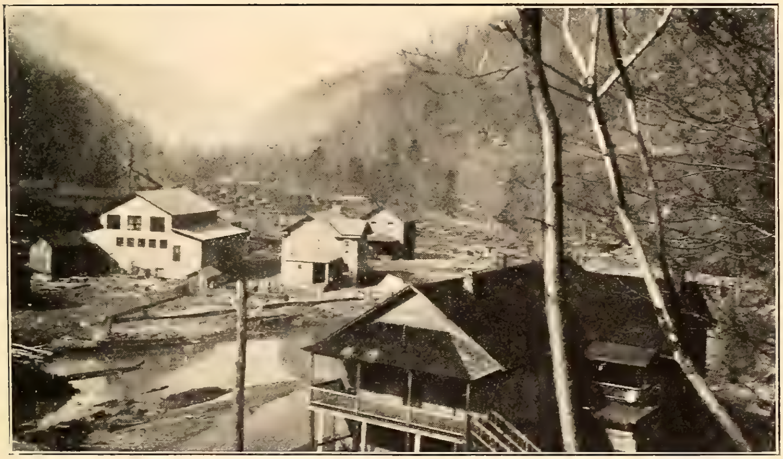

PLATE XX(b).—View of the coal mining town of Mahan on Paint Creek, looking southwest and showing topography of Kanawha and New River Groups.

Solvay Collieries Co. No. 8 Mine—No. 67 on Map II.

On head of Milburn Creek, 0.6 mile east of Mine No. 65; **Powellton (Brownstown) Coal**; elevation, 2175′ B.; section by Teets, at drift mouth.

			Feet.	Inches.
Coal, (slate roof)	1′	2″		
Slate, gray	1	6		
Coal	2	1		
Slate	0	6		
Coal (slate floor)	3	2	8	5

The following section was measured by A. M. Hagan in 1918 at this mine:

			Feet.	Inches.
1. **Coal**, roof	1′	0″		
2. Shale, blue	1	6		
3. Slate	0	3		
4. **Coal**	2	6		
5. Slate	1	2		
6. **Coal**	2	6	8	11
7. Sandstone and shale floor				

"Coal owned by Solvay Collieries Company; principal office, Syracuse, New York; daily capacity, 100 tons; daily output, 60 tons; 3 laborers and 10 miners employed; motor haulage; used for by-product purposes; shipped west; greatest rise, S. 55° E.; sample No. 938H collected from Nos. 4 and 6 of section in Main Right Heading, 3000 feet from drift mouth; authority for data, F. H. Martin; started operations in 1915; Nos. 1, 2, and 3 are not mined."

The analysis of the sample collected by Mr. Hagan, as reported by Messrs. Hite and Krak, is given under **Mine No. 67** in Table 1 at the end of this Chapter.

Milburn Coal Co. Prospect Opening—No. 67A on Map II.

On point, south side of Paint Creek, 1.5 miles S. 75° W. of Keeferton; **Powellton (Brownstown) Coal**; elevation, 1935′±B.; section by R. B. Whitaker on plan furnished Teets.

			Feet.	Inches.
Coal	4′	0″		
Slate and **coal**	2	0		
Coal, hard, splint	4	2		
Slate and **coal**	1	3	11	5

Coal Prospect—No. 353 on Map II.

In ravine, south hillside of Kanawha River, 2.4 miles S. 30° W. of Kanawha Falls; **Powellton (Brownstown) Coal**; elevation, 1400′ B.; examined by author.

			Feet.	Inches.
Shale, gray, argillaceous, visible			0	3
Coal, gas, medium-hard	2′	0″		
Coal, bony	0	2		
Coal, gas, medium-hard	0	7	2	9
Sandstone, massive			30	0

Coal Exposure—No. 354 on Map II.

On ridge, 1.5 miles N. 75° W. of Cotton Hill; **Powellton (Brownstown) Coal**; elevation, 1770′ B.; section by Teets.

			Feet.	Inches.
Coal, croppy (slate roof)	1′	7″		
Shale, and slate	0	5		
Coal	0	4		
Slate, black	0	2		
Coal	0	8		
Slate	0	8		
Coal, (slate floor)	0	6	4	4

Mountain Cove District.

In Mountain Cove District, the Powellton (Brownstown) Coal is confined to the northern border in Gauley Mountain and its intimately associated spurs, as shown on Figure 14, although there are two small patches in the high ridge lying immediately west of Opossum Creek. A careful analysis of all the data in hand and the special sections published in Chapter IV for Albion—Woods Ferry, Ansted, and Mulvane—1 Mile Southwest, pages 139, 171, and 173, respectively, warrants the assumption on a subsequent page of a thickness of 18 inches for this bed in the table of estimates for available tonnage. Owing to the lack of mines and prospect openings on it in this District information is quite meager.

Fayetteville District.

In Fayetteville District, the Powellton (Brownstown) Coal is confined to five scattered areas in the northwest border, as shown on Figure 14. Along the extreme western border and the southwestern edge it has been prospected to some extent by the large land-holding companies. In the latter region, its thickness and stratigraphic position are exhibited in the Potato Hill Knob and Herberton Sections, published in Chapter IV, pages 191 and 194, respectively. Its description at exposures and prospects follows.

Coal Exposure—No. 355 on Map II.

In hill road, 1.1 miles northwest of Beckwith; **Powellton (Brownstown) Coal**; elevation, 1810′ B.; examined by Teets.

			Feet.	Inches.
Sandstone, visible			2	0
Coal	0′	11″		
Slaty shale	0	7		
Coal	1	0		
Slate	0	8		
Coal (slate floor)	0	7	3	9

Coal Opening—No. 356 on Map II.

On head of branch of Dempsey Branch, 0.3 mile southeast of Ford Knob; **Powellton (Brownstown) Coal**; elevation, 1995′ B.; examined by author.

	Feet.	Inches.
Coal, opening closed, reported 3′ 0″ to	4	0

Coal Opening—No. 357 on Map II.

On head of Dempsey Branch, 1 mile due south of Ford Knob; **Powellton (Brownstown) Coal**; elevation, 2045′ B.; examined by author.

	Feet.	Inches.
Coal, opening in run, closed, reported by R. E. Amick, clean, soft coal, no partings, with thickness of	4	0

Coal Exposure—No. 358 on Map II.

On southeast side of Potato Hill Knob, 2¼ miles northwest of Herberton; **Powellton (Brownstown) Coal**; elevation, 2345′ B.; for stratigraphic position see Potato Hill Section, page 191; examined by author.

			Feet.	Inches.
Shale, sandy				
Coal, soft, columnar	1′	9″		
Shale, gray, sandy, hard	1	6		
Coal, soft, columnar	2	10		
Slate, gray	0	1		
Coal (slate floor)	0	2	6	4

Willis Branch Coal Co. Coal Prospect—No. 359 on Map II.

On head of Willis Branch, 1.6 miles due west of Herberton; **Powellton (Brownstown) Coal**; elevation, 2595' B.; examined by author.

			Feet.	Inches.
Sandstone, flaggy, visible, **Brownstown**.........			3	0
Coal, soft, columnar................	0'	2½"		
Slate, bony, black, 2" to.............	0	2½		
Coal, soft, colunmar................	1	3		
Shale, gray, argillaceous, soft, with coal streak in basal 6"............	1	2		
Coal, soft, columnar (slate floor)....	2	5 ...	5	3

Thos. Laing, Vice-President of the Willis Branch Coal Co., was inclined to believe that the coal at the above opening represented the No. 2 Gas bed, but the latter evidently belongs 75 to 80 feet higher in the measures, as will readily be seen from a study of the Potato Hill Knob and Herberton Sections, published in Chapter IV, pages 191 and 194, respectively, and the remarks in connection therewith.

Willis Branch Coal Co. Coal Prospect (Closed)—No. 360 on Map II.

At "Knuckle" of incline to Mine No. 56 on Map II, 0.9 mile west of Herberton; **Powellton (Brownstown) Coal**; elevation, 2645' B.; examined by author.

	Feet.	Inches.
Sandstone, gray and brown, micaceous, **Brownstown**	45	0
Sandy slate, 8" to............................	0	10
Coal, only top is visible, with partings, reported	5	0

Quantity of Powellton (Brownstown) Coal Available.

Based on all the evidence in hand and that given on preceding pages, and a planimetric determination by A. M. Hagan of the area of the Powellton (Brownstown) Coal from Map II, as limited on Figure 14, the following estimate is made by the author of its available tonnage in Fayette County by magisterial districts:

Probable Amount of Powellton (Brownstown) Coal.

District.	Thickness of Coal Assumed. Feet.	Square Miles.	Acres.	Cubic Feet of Coal.	Short Tons of Coal.
Falls	1.5	53.37	34,156.8	2,231,805,312	89,272,212
Kanawha	3.5	50.03	32,019.2	4,881,647,232	195,265,889
Mountain Cove....	1.5	3.35	2,144.0	140,088,960	5,603,558
Fayetteville	3.0	3.69	2,361.6	308,613,888	12,344,556
Totals for County	....	110.44	70,681.6	7,562,155,392	302,486,215

THE EAGLE COAL.

The Eagle Coal, described briefly in Chapter VI, pages 260-1, ranks third in Fayette County to the Sewell and Campbell Creek beds in economic importance and available tonnage. Its detailed outcrop is shown on Map II and its minable area on Figure 15. Like the No. 2 Gas member of the Campbell Creek Coal it has long been mined commercially in the State, as also in the territory of this Report. Its excellent character as a steam and coking coal, and for steam and domestic fuel purposes is attested by the following average results from the State as a whole, compiled by R. C. Tucker from 21 separate analyses published in previous State Survey Reports mostly from widely scattered commercial mines in Fayette, Logan, Mingo and McDowell Counties in the southern half of West Virginia:

		Per cent.
Moisture		0.96
Volatile Matter..................................		30.28
Fixed Carbon....................................		63.70
Ash		5.06
Total		100.00
Sulphur		1.02
Phosphorus		0.005
Calorimeter B. T. U..................	14,658	

The above average results show that the Eagle Coal is slightly lower in volatile matter than the average of 65 samples of the Campbell Creek bed, published on page 500, and that it is correspondingly higher in fixed carbon and calorific value; and that this bed, along with the one last mentioned, appears to occupy a transitional stage between the "gas" and "splint" types of the upper two-thirds of the Kanawha Group of the Pottsville and the exceptional low volatile beds of the underlying New River Group. Northeastward from Gauley River in Nicholas, Braxton, and Webster Counties, the Eagle appears to increase in percentage of sulphur and ash carried and consequently does not possess the excellent reputation obtaining for it southwest of Gauley River.

The Eagle Coal has been prospected considerably throughout the region of its outcrop in Fayette by natives for local domestic fuel and by the large land-holding companies, and it has been operated on a commercial scale at about 25 separate mines. Its thickness and character at these openings and other exposures will now be described by magisterial districts.

Falls District.

In Falls District, the Eagle Coal outcrops above drainage except in the northwest border northward from Kanawha River, as shown on Figure 15 and Map II, so that over the greater portion of the District it is accessible to drift openings. Its thickness and stratigraphic position here are exhibited in the sections published in Chapter IV for Cannelton, Smithers, Marting, Harewood, Boomer—¾ Mile East, Deepwater—½ Mile North, Gauley Bridge—1 Mile Southeast, Gamoca, Belva—1 Mile Northeast, Albion, Panther Mountain, and Peters Creek, page references to which are given in the Index; in the log of Well No. 10 on Map II, in connection with the Marting -¼ Mile Southeast Section, page 123; and in the logs of Coal Test Borings Nos. 2-7, inclusive, on Map II, page references to which are given in the Index. Within the limits of Falls District it is mined extensively on a commercial scale along Smithers Creek, Boomer Branch and the north hillside of the Kanawha River, and it has also been prospected to some extent by natives for local domestic fuel. Its description at these openings and other exposures follows.

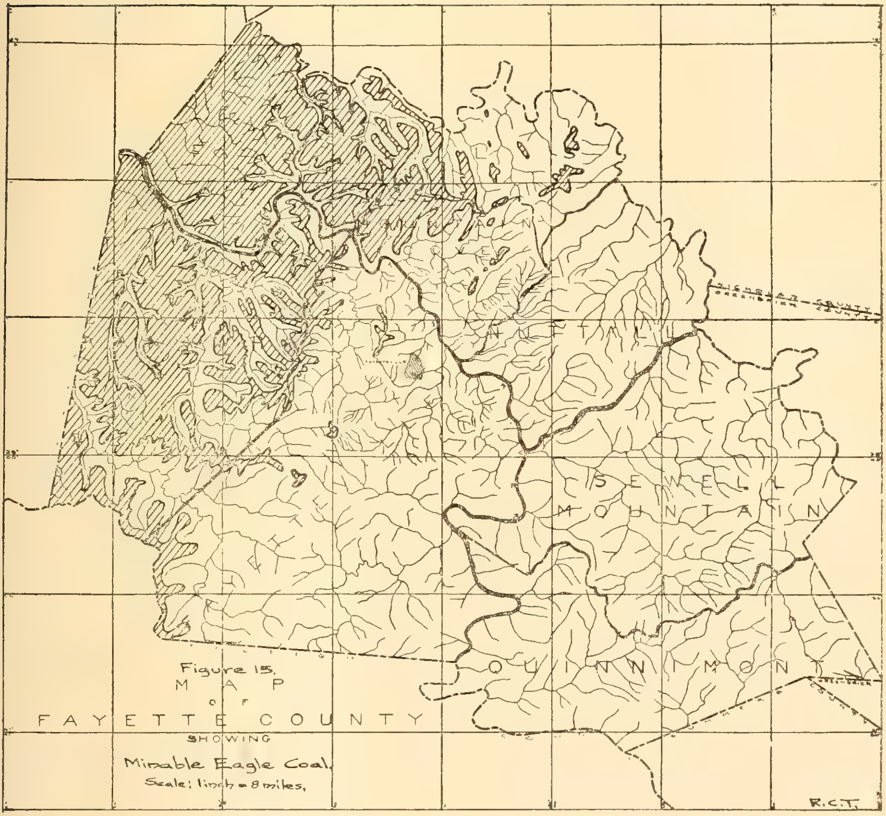

Figure 15.
MAP
OF
FAYETTE COUNTY
SHOWING
Minable Eagle Coal.
Scale: 1 inch = 8 miles.

Cannelton Coal Co. No. 3 Mine—No. 68 on Map II.

On west bank of Smithers Creek at Carbondale; **Eagle Coal;** elevation, 650′ B.: section measured by Teets, 100 feet under.

			Feet.	Inches.
Slate, hard, ferriferous, shaly, visible			15	0
Coal, soft			0	1
Slate, shaly, ferriferous			1	6
Coal			0	1
Slate, ferriferous			0	9
Coal, gas	1′	7″		
Slate, gray	0	2		
Coal, gas	2	0		
Coal, hard, splint	0	3		
Coal, gas (slate floor)	0	2	4	2

W. R. Johnson Coal Co. No. 1 Mine—No. 69 on Map II.

On east hillside of Kanawha River, ¼ mile southeast of Smithers; **Eagle Coal**; elevation, 690′ B.; section measured by Teets in main heading, 300 feet under cover.

			Feet.	Inches.
Coal, (slaty shale, gray, roof)	0′	3″		
Slate, black	0	1		
Coal, block	1	3		
Slate, gray, 2″ to	0	3		
Coal, gas, glossy	2	1		
Bone (slate floor)	0	3	4	2

"Principal office, Smithers; opened in 1902; capacity, 800 tons daily; number of men employed at No. 1 Mine (in Eagle, **No. 69 on Map II**) and No. 2 Mine (in No. 2 Gas, **No. 24 on Map II**), 50 miners and 25 laborers; coal shipped west for domestic and steam purposes; W. K. Bridges, Superintendent, authority for mine data; electric haulage. (See page 507 for description of No. 2 Gas Mine, **No. 24 on Map II**)."

Kanawha & Hocking Coal & Coke Co. Mine—No. 70 on Map II.

On east hillside of Kanawha River at Longacre; **Eagle Coal**; elevation, 775′ B.

				Feet.	Inches.
Shale, sandy, ferriferous nodules, visible				12	0
Sandstone				2	0
Coal				0	3
Shale, gray and slaty				3	0
Sandstone				2	0
Shale, slaty, gray				2	0
Coal	0′	3″			
Slate, black	0	0½			
Coal, block	1	4½			
Slate	0	3			
Coal, gas, glossy	2	1			
Bony coal	0	5			
Coal, gas (slate floor)	0	3	**Eagle**	4	8

Kanawha & Hocking Coal & Coke Co. No. 116 Mine—No. 71 on Map II.

On east hillside of Kanawha River, ½ mile northwest of Harewood; **Eagle Coal**; elevation, 840′ B.; for stratigraphic position see Harewood Section, page 124; examined by Teets.

			Feet.	Inches.
Shale, sandy, visible			25	0
Slate, gray			10	0
Coal, blocky	1′	8″		
Slate, gray	0	4		
Coal, gas, glossy (slate floor)	2	10	4	10

"Coal owned by same Company. This mine was operated by Sunday Creek Coal Company from June, 1905, to August, 1916.

Boomer Coal & Coke Co. Mine—No. 72 on Map II.

On northwest hillside of Boomer Branch, 0.3 mile northeast of Boomer; **Eagle Coal**; elevation, 895′ B.; examined by Teets.

			Feet.	Inches.
Sandstone, gray, visible			10	0
Slate			0	2
Coal	1′	3″		
Slate	0	2		
Coal	2	0	3	5

Boomer Coal & Coke No. 2N Mine—No. 73 on Map II.

On north hillside of Boomer Creek, 1.5 miles northeast of Boomer; **Eagle Coal**; elevation, 963′ L.; examined by Teets.

			Feet.	Inches.
Concealed			27	0
Limestone			3	0
Shale, gray			15	0
Coal, gas	2′	0″		
Slate	0	1		
Coal	1	5		
Slate, gray, 2″ to	0	5		
Coal, gas	1	0		
Coal, harder	1	0	5	11

The following section was measured at this mine by R. W. Edmonds as given by Dr. White on page 589 of Volume II:

			Feet.	Inches.
Sandstone				
Draw slate			0	3
Coal	3′	11″		
Slate	0	3		
Coal	2	0	6	2

"Butts run N. and S.; Faces, E. and W."

The analysis of a sample of coal collected by Mr. Edmonds from this mine, as analyzed by Prof. Hite and given by Dr. White on page 589 of Volume II and republished by him on page 258 of Bulletin 2 and page 344 of Volume II(A), of the Survey, is given under **Mine No.** 73 in Table 1 at the end of this Chapter.

The coal bed at the above mine was measured and sampled at two points on December 3, 1915, by H. D. Jones and J. W. Grove, of the U. S. Bureau of Mines, as given on page 399 of Bulletin 123 of the latter Bureau, the analyses being published on page 116.

Section A (sample 23487) was gathered at a point 10,800 feet northeast of pit mouth; thickness of bed, 5′ 5½″; thickness of coal sampled, 4′ 7″.

Section B (sample 23488) was gathered at a point 11,000 feet N. 35° W. of pit mouth; thickness of bed, 5′ 7½″; thickness of coal sampled, 4′ 6″.

The ultimate analysis of a composite sample made by combining samples 23487 and 23488 is given under laboratory **No. 23489**.

These three analyses are given under **Mine No.** 73 in Table 3 at the end of this Chapter.

"Notes.—Thickness, 5 to 6 feet. The seam outcrops on either side of and approximately 50 feet above the bed of Boomer Creek. Cover, 700 to 1,000 feet. Dip is slight. The coal is of the 'gas' type, and has the columnar structure of typical coking coal, without any splinty layers. Its physical character much resembles the Pottsville coals of New River, and it makes excellent coke and steam coal. Main roof is sandstone and shale; immediate roof is dark, brittle shale. Floor is rather hard, smooth clay, which does not become mixed with the coal in mining. In 1915 the coal was cut by hand or electric chain machines, near the top of the bed when cut with picks, and at the bottom if by machine, and was shot down by black powder. The daily production was 2,000 tons."

Coal Opening—No. 361 on Map II.

On point, ¼ mile southeast of Boomer; **Eagle Coal**; elevation, 945′ B.

			Feet.	Inches.
Sandstone, visible, gray			10	0
Coal, soft	2′	3″		
Coal, bony	0	3		
Coal, gas, (slaty shale floor)	0	7	3	1

The stratigraphic position of the Eagle bed at **Coal Prospect (Abandoned)—No. 362 on Map II,** on the north hillside of Kanawha River, 1.1 miles east of Mt. Carbon, at an elevation of 1080′ B., as determined by Teets, is exhibited in the Deepwater—½ Mile North Section in Chapter IV, page 127.

Boomer Coal & Coke Co. Prospect—No. 363 on Map II.

On east hillside of Scrabble Creek, 1.9 miles N. 45° W. of Gauley Bridge; **Eagle Coal**; elevation, 1000′ B.; examined by Teets.

			Feet.	Inches.
Slate, dark, visible			12	0
Coal, gas	0′	11″		
Slate	0	0½		
Coal, gas	0	9½		
Slate, sandy, gray	0	8		
Coal, gas (slate floor)	2	10	5	3

Sunday Creek Coal & Coke Co. Coal Opening—No. 364 on Map II.

On south hillside of Left Fork, 1.8 miles N. 70° W. of Gamoca; **Eagle Coal**; elevation, 955′ B.; examined by Teets.

			Feet.	Inches.
Slate, plant fossils				
Coal, gas	1′	6″		
Slate	0	1		
Coal (slate floor)	2	6	4	1

Green Smith Coal Opening—No. 365 on Map II.

On south hillside of Bells Creek, 1.2 miles N. 5° W. of Belva; **Eagle Coal**; elevation, 745′ B.; section by D. B. Reger.

			Feet.	Inches.
Shale, sandy			10	0
Shale, ferruginous			2	0
Coal, soft	1′	8″		
Slate, bony	0	3		
Coal, soft	1	0	2	11
Sandstone			3	0
Shale and concealed to Bells Creek			7	0

Hill & Long Coal Mine—No. 366 on Map II.

On east hillside of Bells Creek, 0.9 mile north of Belva; **Eagle Coal**; elevation, 755′ B.; examined by Teets.

			Feet.	Inches.
Coal (slate roof)	0′	3″		
Slate	0	2		
Coal	2	6	2	11

Hill & Long Coal Mine—No. 367 on Map II.

On east hillside of Bells Creek, 0.7 mile north of Belva; **Eagle Coal**; elevation, 770′ B.

			Feet.	Inches.
Coal (slate roof)	0′	4″		
Slate, black	0	2		
Coal, gas (slate floor)	2	4	2	10

Greenbrier Coal Co., Greenbrier Mine—No. 368 on Map II.

On north hillside of Twentymile Creek, 0.9 mile northeast of Belva; **Eagle Coal**; elevation, 790′ B.; section by Teets; used in Belva—1 Mile Northeast Section.

	Feet.	Inches.
Coal	3	0

Since the above section was measured by Teets, the above opening has been turned into a commercial mine, the following section having been measured by D. B. Reger for his Report on Nicholas County:

Coal, slaty (sandstone, shaly, roof)	0′	1″		
Shale, dark	0	7		
Coal, medium-soft, columnar	2	3	2	11
Sandstone pavement				

Mr. Reger also measured the following section in No. 1 Air-Course of the above mine and collected a sample (305R) for analysis from No. 3 of section, the results of which, as reported by Messrs. Hite and Krak, are given under **Mine No. 368** in Table 1 at the end of this Chapter:

	Feet.	Inches.
1. Sandstone, massive		
2. Draw slate	0	6
3. **Coal**, soft, (sandstone, pavement)	2	4

"Principal office, Fort Defiance, W. Va.; 5 miners and 3 laborers employed; daily output, 35 tons; mule haulage; greatest rise, southeast; Roan Cottrell, Superintendent, authority for mine data."

Gauley Mountain Coal Co. Prospect—No. 369 on Map II.

On west hillside of Lick Branch of Rich Creek, 1.3 miles south of Jodie; **Eagle Coal**; elevation, 1090′ B.; examined by Teets.

			Feet.	Inches.
Slate, full of iron nodules, visible			7	0
Coal, gas	3′	1″		
Slate, gray, plant fossils	1	7		
Coal, gas (slate floor)	2	1	6	9

Gauley Mountain Coal Co. Prospect—No. 370 on Map II.

On east hillside of Rich Creek, opposite mouth of Bridge Fork; **Eagle Coal**; elevation, 1160′ B.; section as reported to Teets.

			Feet.	Inches.
Coal (sandstone roof)	3′	0″		
Slate	2	8		
Coal	1	10	7	6

Widow Burns Coal Opening—No. 371 on Map II, on west hillside of Horseshoe Creek, 1.7 miles northwest of Mulvane, **Eagle Coal,** elevation, 1695′ B., was closed and thickness not learned.

Coal Opening—No. 372 on Map II.

On west side of hill road, ½ mile southwest of Mulvane; **Eagle Coal**; elevation, 1855′ B.; examined by author.

			Feet.	Inches.
1. Slate, sandy, roof				
2. **Coal**, sulphurous	1′	1″		
3. **Coal**, bony, 1″ to	0	2		
4. **Coal**, soft, columnar	1	5		
5. Slate, black, bony	0	2		
6. **Coal**, soft, columnar	0	9	3	7
7. Slate				

No. 4 of section is reported exceptionally fine for smithing purposes, No. 2 being too high in sulphur.

The stratigraphic position of the Eagle bed at **Coal Exposure No. 373 on Map II,** on summit of high knob, 1.15 miles S. 5° W. of mouth of Peters Creek, at an elevation of 1775′ B., is shown in the Mouth of Peters Creek Section, page 138.

J. F. Cavendish Coal Opening—No. 374 on Map II.

On north hillside of Gauley River, edge of Nicholas County, 1 mile N. 20° E. of Albion; **Eagle Coal**; elevation, 1685′ B.; for stratigraphic position see Albion—Woods Ferry Section, page 139; section of coal as reported by O. W. Mason; opening closed; examined by author.

			Feet.	Inches.
Sandstone, **Eagle**			64	0
Coal	1′	0″		
Slate	0	2		
Coal	1	10		
Slate	0	2		
Coal, 0′ 8″ to	0	10	4	0
Shale, buff, sandy			6	0

Mountain Cove District.

In Mountain Cove District, the Eagle Coal, as shown on Figure 15 and Map II, is confined to the northwest portion and to the high ridge immediately west of Opossum Creek. Its thickness and stratigraphic position are exhibited in the sections published in Chapter IV for Ansted—Hawks Nest and Mulvane—1 Mile Southwest, pages 171 and 173, respectively. Owing to the lack of prospects the information is somewhat meager concerning the thickness and character of this bed in the Distict in question, but a careful analysis of all the data in hand, including its condition in the immediately adjoining portion of Falls District, it is believed warrants the assumption of a thickness of 3 feet for this seam in the estimate table of available tonnage of Eagle Coal given on a subsequent page.

Kanawha District.

In Kanawha District, the Eagle Coal, as shown on Figure 15 and Map II, outcrops above drainage over the greater portion of the District, thus making it readily accessible to drift openings. Its thickness and stratigraphic position are exhibited in the sections published in Chapter IV for Crescent, Mt. Carbon, Deepwater, Beckwith, Kimberly, Columbia—1.2 Miles Southwest, Elk Ridge, Powellton, Head of Powellton Fork, Page, Head of Johnson Fork, Keeferton, Kingston—1.7 Miles West, and Kingston, page references to which are given in the Index; in the logs of test wells for oil and gas Nos. 12, 21, 22, and 29 on Map II, given in Chapter X; and in the log of Coal Test Boring No. 12 on Map II, page 398. There are about 16 commercial mines on the Eagle Coal in this District and it has also been prospected considerably by the large land-holding companies. Its description at these openings and other exposures follows.

Coal Opening—No. 375 on Map II.

On east bank of Morris Creek, 0.4 mile south of Montgomery; **Eagle Coal**; elevation, 665′ B.; examined by the author.

	Feet.	Inches.
Coal, No. 2 Gas	4	0
Slate and concealed, mostly	78	0
Limestone, **Cannelton**, siliceous	2	0
Shale, flaggy, siliceous	10	0
Concealed	22	0
Shale, flaggy and sandy	10	0
Coal, Eagle, digging closed	3	0
Concealed, to bed of Morris Creek	10	0

Eagle Coal Co. "Straughan" Mine—No. 74 on Map II.

On south hillside of Kanawha River, east edge of Montgomery; **Eagle Coal**; elevation, 635′ B.; examined by author.

			Feet.	Inches.
Slate, dark, 0″ to			0	6
Coal, bony	0′	4″		
Coal, gas	0	10		
Slate, black, **coaly**	0	3		
Coal, gas (slate floor)	2	4	3	9

"Operated by colored folks one year. Goes down on slope. An old mine. Output, 75 to 80 tons. Shipped west for steam. Formerly owned by Economy Coal Company and before that by John Straughan and Coal Valley Mining Company. Men employed, 15 loaders, 3 mule drivers, and 2 tipple men. Matt Buster (colored) chief owner of plant. Pick mining."

The following section was measured by A. P. Brady at this mine in 1902 as published by Dr. White on page 587 of Volume II on the Survey:

				Feet.	Inches.
Sandstone					
Slate, 5′ 0″ to				9	0
Coal	0′	2½″			
Bone coal	0	1½			
Coal	0	8			
Slate	0	2			
Coal, soft	0	9			
Coal, hard	0	8½			
Coal	0	8	**Eagle**	3	3½

"Butts run N. 77° E.; Faces N. 13° W.; Greatest rise, S. 50° E."

Mr. Brady also collected a sample of the coal for analysis, the results of which, as reported by Prof. Hite and published by Dr. White on page 589 of Volume II, and republished by him on page 258 of Bulletin 2 and page 344 of Volume II(A), are given under **Mine No. 74** in Table 1 at the end of this Chapter.

W. R. Johnson No. 1 Mine (Abandoned)—No. 75 on Map II.

On south hillside of Kanawha River, at Crescent; **Eagle Coal**; elevation, 683′ L.; for stratigraphic position see Crescent Section, page 145; examined by the author.

	Feet.	Inches.
Coal, (abandoned on account of dirty coal)	3	6

The following section was measured by A. P. Brady and published by Dr. White on page 588 of Volume II:

			Feet.	Inches.
Coal (slate roof)	1′	1½″		
Slate	0	3		
Coal	2	2½	3	7

"Butts run N. 77° E.; Faces, N. 13° W.; Greatest rise, S. 50° E."

The analysis of a sample of coal collected by Mr. Brady and analyzed by Prof. Hite, as published by Dr. White on page 589 of Volume II and republished by him on page 258 of Bulletin 2 and page 344 of Volume II(A) of the Survey, is given under **Mine No. 75** in Table 1 at the end of this Chapter.

The analysis of a sample of coke collected by Mr. Brady and analyzed by Prof. Hite, as published by Dr. White under No. 1 in the table of coke analyses on page 590 of Volume II and republished by him under the same number on page 258 of Bulletin 2 and page 345 of Volume II(A) of the Survey, is given under Mine No. 75 in Table 2 at the end of this Chapter.

The sample of coke appears to be higher in ash than the corresponding coal analysis would warrant, but it is probably due to the fact that some fine slate particles got into the screenings which are used in the ovens.

Kanawha Rail & River Coal Co.—Edgewater No. 1 Mine—No. 76 on Map II.

On southwest hillside of Kanawha River, 0.4 mile northwest of Eagle; **Eagle Coal**; elevation, 740′ B.; examined by author.

			Feet.	Inches.
Shale, dark, visible			8	0
Sandstone			4	6
Shale, buff, sandy			5	0
Coal, gas	1′	3″		
Shale, dark-gray	0	3		
Coal, gas, columnar	2	10	4	4
Sandstone, visible			3	0

The following section was measured by A. P. Brady at the above mine in 1902 when it was being operated by Carver Brothers, as published by Dr. White on page 588 of Volume II:

			Feet.	Inches.
Sandstone				
Slate			1	6
Coal	0′	4 ″		
Slate	0	0½		
Coal	1	1		
Slate	0	3		
Coal	3	0	4	8½

"Butts run N. 77° E.; Faces, N. 13° W.; Greatest rise, S. 50° E."

Mr. Brady also collected a sample of the coal for analysis, the results of which, as reported by Prof. Hite and published by Dr. White on page 589 of Volume II and republished by him on page 344 of Volume II(A) and page 258 of Bulletin 2 of the Survey, are given under **Mine No. 76** in Table 1 at the end of this Chapter. Mr. Brady also took a sample of the coke for analysis by Prof. Hite, the results being published by Dr. White under No. 2 in the table of coke analyses on page 590 of Volume II and republished by him under the same number on page 345 of Volume II(A) and pages 258-9 of Bulletin 2. This analysis is given under **No. 76** in Table 2 at the end of this Chapter.

The coke analysis appears to be higher in ash than the corresponding coal analysis would warrant, but it is probably due to the fact that some fine slate particles got into the screenings which are used in the ovens.

St. Clair Coal Mining Co. Mine—No. 77 on Map II.

On southwest hillside of Kanawha River, southeast edge of Eagle; **Eagle Coal**; elevation, 837′ L.; section at entrance by author.

					Feet.	Inches.
Shale, sandy					15	0
Coal, gas, medium-hard, columnar			1′	2″		
Shale, gray	0′	1″				
Coal, hard	0	2	0	7		
Slate and coal, interlaminated	0	4				
Coal, gas, soft, columnar			2	6	4	3
Slate, gray						

Mr. A. P. Brady made the following measurement at this mine as published by Dr. White on page 588 of Volume II, when the mine was being operated by the St. Clair Coal & Coke Company:

				Feet.	Inches.
Sandstone					
Draw slate					
Coal	1′	4″			
Fire clay	0	3			
Coal	0	2			
Slate	0	4			
Coal	2	8	**Eagle**	4	9

"Butts run N. 77° E.; Faces, N. 13° W.; Greatest rise, S. 50° E."

Mr. Brady took a sample of this coal for analysis and the results, as reported by Prof. Hite and published by Dr. White on page 589 of Volume II and republished by him on page 344 of Volume II(A) and page 258 of Bulletin 2 of the Survey, are given under **Mine No. 77** in Table 1 at the end of this Chapter.

Mr. Brady also sampled the coke made at this mine for analysis by Prof. Hite whose results were published by Dr. White under No. 2 on page 590 of Volume II and republished by him under the same number on page 345 of Volume II(A) and pages 258-9 of Bulletin 2 of the Survey. This analysis is given under **No. 77** in Table 2 at the end of this Chapter.

The coke analysis appears to be higher in ash than the corresponding coal analysis would warrant, but it is probably due to the fact that some fine slate particles got into the screenings which are used in the ovens.

Great Kanawha Colliery Co.—Mt. Carbon No. 1 Mine—(Abandoned)—No. 78 on Map II.

On point, 0.2 mile northwest of Mt. Carbon; **Eagle Coal**; elevation, 1000′ B.; section at drift entrance by author.

				Feet.	Inches.
Sandstone, visible				3	0
Shale, buff, sandy				2	6
Coal, soft, **Eagle "A"**				0	7
Shale, buff, sandy, with 2″ coal 11′ below top				17	0
Coal, soft	2′	2″			
Coal, bony, hard	0	2			
Coal, soft	0	6	**Eagle**	2	10
Shale, gray				2	0

The above mine was abandoned in December, 1915, on account of small coal (2′ 8″ clean coal). The mine had been in operation for 30 years, the last 4 years by Evans Brothers.

Coal Exposure—No. 376 on Map II.

On branch of Jenkins Fork of Armstrong Creek, 0.6 mile N. 75° W. of Little Stop Hollow; **Eagle Coal**; elevation, 1000′ B.; used in Columbia—1.2 Miles Southwest Section, page 154.

			Feet.	Inches.
Shale, flaggy and sandy			13	5
Coal, slaty	0′	2″		
Shale, black, **coal** streaks	0	3		
Coal, soft	2	2	2	7
Shale			3	0
Shale, flaggy and sandstone, flaggy			20	9
Coal, Little Eagle			1	3

Coal Opening—No. 377 on Map II.

On east hillside of Armstrong Creek, at Elk Ridge; **Eagle Coal**; elevation, 1345′ B.; for stratigraphic position see Elk Ridge Section, page 155; examined by author.

			Feet.	Inches.
Coal, gas, columnar (slate roof)	0′	8″		
Bone	0	2		
Slate, gray	2	0		
Coal, soft, columnar (slate floor)	2	4	5	2

Coal Exposure—No. 378 on Map II.

On west bank of Left Fork of Armstrong Creek, 2 miles due west of Kincaid; **Eagle Coal**; elevation, 1645′ B.; examined by author.

			Feet.	Inches.
Sandstone, visible			5	0
Shale, brown, sandy			3	6
Coal, gas	0′	8½″		
Slate, **coaly**	0	0½		
Coal, gas	2	9		
Coal, slaty	0	2	3	8
Shale, buff, argillaceous			5	0
Concealed to bed of Armstrong Creek			30	0

Mt. Carbon Co. Coal Exposure—No. 379 on Map II.

On east bank of Left Fork of Armstrong Creek, 0.2 mile southeast of Mine No. 378; **Eagle Coal**; elevation, 1655′ B.; examined by author.

				Feet.	Inches.
Sandstone, visible				5	0
Shale, sandy and buff at top, dark and argillaceous at bottom				6	0
Coal, gas	0′	5½″			
Slate, black, 1″ to	0	1½			
Coal, slaty	0	2½			
Slate, black, 1″ to	0	1½			
Coal, gas, medium-soft	2	5			
Slate	0	1			
Coal, gas	0	4			
Coal, slaty	0	2	**Eagle**	3	11
Shale, buff, argillaceous				4	4
Coal, gas, medium-soft, **Little Eagle**				2	4
Fire clay shale to bed of Armstrong Creek				1	0

Coal Exposure—No. 380 on Map II.

On head of Powellton Fork; **Eagle Coal**; elevation, 1495′ B.; for general stratigraphic position see Head of Powellton Fork Section, page 162; examined by author.

				Feet.	Inches.
Shale				5	0
Coal, slaty	0′	6″			
Shale, gray	1	6			
Coal, soft, columnar	3	0			
Slate, black	0	2			
Coal, bony	0	10	**Eagle**	6	0
Shale, sandy				13	0
Coal, soft, columnar, **Little Eagle**				2	3
Shale, gray				1	9
Sandstone, to railroad grade				7	0

In the two foregoing exposures the interval between the Eagle and Little Eagle beds has thinned much below the normal interval prevailing northward and northeastward, in fact 4 to 5 miles southward on Paint Creek both beds are operated in the same mining section at Mines Nos. 82-88, inclusive, on Map II.

Coal Opening—No. 381 on Map II.

On east hillside of Powellton Fork, 0.3 mile northwest of Woodrum Branch; **Eagle Coal**; elevation, 1490′ B.; examined by author.

			Feet.	Inches.
Shale, sandy, buff, visible			8	0
Coal, gas	0′	2″		
Slate, gray	0	1		
Coal, gas	0	1		
Shale, gray	1	6		
Coal, soft, columnar	3	0 ...	4	10
Concealed to water				

The above opening occurs 105 feet above an exposure of the fossiliferous Eagle Limestone.

Loup Creek Colliery Co. Mine No. 8—No. 79 on Map II.

On east hillside of Loop Creek, 1.2 miles northeast of Page; **Eagle Coal**; elevation, 1536′ L.; section as measured by the author and published by Dr. White on pages 341-2 of Volume II(A).

				Feet.	Inches.
1.	Sandstone				
2.	**Coal**, gas	0′	3″		
3.	Slate	0	6		
4.	**Coal**, gas	1	0		
5.	Slate, gray	1	0		
6.	**Coal**, bony	0	2		
7.	**Coal**, soft, gas	1	1		
8.	**Coal**, slaty	0	5		
9.	Slate, gray	0	6½		
10.	**Coal**, gas, soft	2	2		
11.	**Coal**, bony	0	4		
12.	**Coal**, soft	0	2	7	7½
13.	Fire clay				

"Butts, N. 65° E.; Faces, S. 25° E.; greatest rise, S. 22½° E. (105 feet per mile); coal mostly pulverized along with No. 2 Gas, 180 feet higher, and coked in beehive ovens; mine capacity, 125 tons; men employed, 40; sample from Nos. 4, 7, and 10, and also a separate sample from No. 11, the analyses of which were published by Dr. White under Nos. 21 and 22, respectively, in Table No. 3, page 348 of Volume II(A), and republished by him under the same numbers in Table No. 10 on page 257 of Bulletin 2 of the Survey. On other portions of the property openings into the Eagle seam have fewer partings and they are quite thin, Mr. Hennen reports. Some coal is shipped both east and west for fuel and steam purposes; authorities for mine data, J. R. C. Taylor, General Manager, and D. S. Dooley, Mine Foreman."

The above mentioned analyses are given under **Mine No. 79** in Table 1 at the end of this Chapter. The analyses of three samples of coke made from the Eagle and No. 2 Gas Coals at Mines No. 79 and 51 on Map II are given under the description of **Mine No. 51**, page 538.

Five analyses of the coal from this mine are given under No. 79 in Table 3 at the end of this Chapter, as published on pages 235 and 236 of Bulletin No. 22 of the U. S. Bureau of Mines.

Sample No. 6932 was taken 800 feet from opening, in room 10, off airway 8, by G. S. Pope on December 17, 1908, and was wet when taken. Thickness of bed, 6′ 8½″; thickness of coal sampled, 4′ 11½″. Section of coal as measured by Mr. Pope is given on page 935 of Bulletin 22 of the U. S. Bureau of Mines.

"No machines were used; coal was easily shot down and picked. The coal all went to 1½-inch screens; that which passed over was designated steam coal, and that which went through was used in coke ovens."

Sample No. 1869 was taken from the lower bench of this coal.

Sample No. 1870 was taken from the middle bench, at a point 774 feet from the mine opening.

Sample No. 2178 was a part of the entire seam, taken in airway 8, 1,100 feet from the mine opening, by J. W. Groves and W. J. von Borries, on September 22, 1905, as given on page 937 of Bulletin 22 of the U. S. Bureau of Mines.

Sample No. 2004 was of run-of-mine coal from car-load delivered at the U. S. Fuel Testing Plant at St. Louis.

For results of tests of this coal, see mention of specific tests as follows—steaming tests: U. S. Geol. Survey Bull. 290, p. 205; Bureau of Mines Bull. 23, pp, 69, 96, 112, 141, and 186; producer-gas tests: U. S. Geol. Survey Bull. 290, p. 205, and Bureau of Mines Bull. 13, pp. 221, 276; coking tests: U. S. Geol. Survey Bull. 290, p. 206; Bull. 336, pp. 25, 34, 44; cupola tests of coke: U. S. Geol. Survey Bull. 336, pp. 52, 55, 57, 61, 64.

For chemical analyses see Part I of Bureau of Mines Bull. 22, pp. 235, 236; also U. S. Geol. Survey Bull. 290, p. 204.

The following Steaming Tests are taken from Bulletin 290, pages 204-205, of the U. S. Geological Survey:

STEAMING TESTS.

Test 178.—Size as shipped, run of mine. Size as used, over 1 inch, 26.8 per cent.; ½ to 1 inch, 14.5 per cent.; ¼ inch to ½ inch, 16.7 per cent.; under ¼ inch, 42 per cent. Duration of test, 10 hours. Kind of grate, plain.

Test 181.—Size as shipped, run of mine. Size as used, over 1 inch, 23.1 per cent.; ½ inch to 1 inch, 15.5 per cent.; ¼ inch to ½ inch, 16.4 per cent.; under ¼ inch, 45 per cent. Duration of test, 7.60 hours. Kind of grate, plain. Limestone spread over grate at start.

MISCELLANEOUS ITEMS.

	Test 178	Test 181
Heating value of coal (B. T. U. per pound dry coal)	15,048	15,003
Force of draft:		
Under stack damper (inch water)	0.42	0.50
Above fire (inch water)	0.16	0.13
Furnace temperature (°F.)	2,337	2,459
Dry coal used per square foot of grate surface per hour (pounds)	14.38	19.31
Equivalent water evaporated per square foot of water-heating surface per hour (pounds)	3.02	3.70
Percentage of rated horse-power of boiler developed	84.6	103.8
Water apparently evaporated per pound of coal as fired (pounds)	8.80	7.84
Water evaporated from and at 212° F.:		
Per pound of coal as fired (pounds)	10.22	9.11
Per pound of dry coal (pounds)	10.52	9.60
Per pound of combustible (pounds)	10.88	10.14
Efficiency of boiler, including grate (per cent.)	67.51	61.79
Coal as fired:		
Per indicated horse-power hour (pounds)	2.77	3.10
Per electrical horse-power hour (pounds)	3.41	3.83
Dry coal:		
Per indicated horse-power hour (pounds)	2.69	2.95
Per electrical horse-power hour (pounds)	3.32	3.64

PROXIMATE ANALYSES.

	Test 178	Test 181
Moisture	2.85	5.15
Volatile Matter	30.13	28.38
Fixed Carbon	64.78	64.09
Ash	2.24	2.38
Totals	100.00	100.00
Sulphur	1.06	1.11

ULTIMATE ANALYSES.

	Test 178	Test 181
*Carbon	83.41	83.16
*Hydrogen	5.07	5.06
*Oxygen	6.51	6.50
*Nitrogen	1.61	1.60
Sulphur	1.09	1.17
Ash	2.31	2.51
Totals	100.00	100.00

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*Figured from car sample.

The following steaming tests are taken from pages 83, 97, 112, 127, 141, and 186 of the Bureau of Mines Bulletin 23:

	Test 178	Test 181
Grate surface (square feet)	40.55	40.55
Kind of draft	Natural	Natural
Average pressure:		
Barometer (inches of mercury)	29.57	29.42
Steam gage (pounds per square inch)	75.0	70.5
Force of draft (inches of water), hood	0.42	0.50
Force of draft (inches of water), furnace	0.16	0.13
Average temperatures (°F.):		
External air	83.0	74.0
Fire room	89.0	76.0
Steam	319.7	316.0
Feed water, in tank	78.0	78.5
Feed water entering boiler	198	182
Escaping gases	592	616
Furnace	2,337	2,459
Fuel:		
Total weight of fuel consumed (pounds):		
As fired	6,001	6,274
Dry	5,830	5,951
Ash and refuse, total (pounds)	102	....
Ash and refuse, clinker (per cent.)	46	....
Total weight of combustible (pounds) determined from:		
Actual weight of ash	5,728	....
Analyses of ash and coal	5,636	5,634
Ash and refuse in dry fuel (per cent.)	1.75	....
Analyses of ash and refuse (per cent.) carbon	58.09	45.70
Analyses of ash and refuse (per cent.) earthy matter	41.91	54.30
Fuel consumed per hour (pounds):		
Dry	583	783
Combustible determined from:		
Actual weight of ash	573	....
Analyses of ash and coal	564	741
Dry per sq. ft. of grate area	14.38	19.31
Combustible per sq. ft. of water-heating surface determined from:		
Actual weight of ash	.282	....
Analysis of ash	.278	.365
Calorific value of fuel per pound (B. T. U.):		
By oxygen calorimeter:		
Dry fuel	15,048	15,003
Combustible	15,403	15,389
By analysis:		
Dry fuel	14,818	14,778
Combustible	15,168	15,158
Quality of steam (per cent.):		
Moisture	1.28	1.05
Factor of correction (dry steam=unity)	.9901	.9919

	Test 178	Test 181
Water evaporation:		
Water fed to boiler (pounds):		
Total weight	52,791	49,162
Equivalent from and at 212° F	61,956	57,618
Actually corrected for quality of steam (pounds)	52,268	48,764
Factor	1.1736	1.1719
Equivalent converted into dry steam from and at 212°F. (pounds)	61,342	57,151
Per hour (pounds):		
Corrected for quality of steam	5,227	6,416
Equivalent from and at 212°F.:		
Total	6,134	7,520
Per sq. ft. of water-heating surface	3.02	3.70
Horse-power:		
Developed on test	177.7	218.0
Builders' rating	210	210
Per cent. of rated horse-power developed	84.6	103.8
Economic results (pounds of water evaporated per pound of fuel:		
Apparent under actual conditions as fired	8.80	7.84
Equivalent from and at 212°F.:		
As fired	10.22	9.11
Dry	10.52	9.60
Combustible determined from:		
Actual weight of ash	10.71	....
Analysis of ash and coal	10.88	10.14
Efficiency (per cent.) of:		
Boiler, from actual weight of ash	67.15	....
Boiler, from analysis of ash and coal	68.21	63.63
Boiler and grate	67.51	61.79
Smoke (per cent. of black)	20.0	20.6
Kind of firing	Alternate	Alternate
Method of firing:		
Thickness of fire (inches)	12	10
Interval between normal firings (minutes)	6	4.5
Interval between times of leveling or breaking up (hours)	1.1	0.6
Analysis of the dry gases (per cent.):		
Carbon dioxide (CO_2)	10.79	11.08
Oxygen (O_2)	7.52	7.29
Carbon monoxide (CO)	0.16	0.29
Nitrogen (by difference) (N_2)	81.53	81.34
Pounds of dry gases per pound of combustible	19.51	18.80
Heat balance, B. T. U.:		
Total	15,403	15,389
Absorbed by boiler	10,507	9,792
Loss of heat due to:		
Moisture in fuel	38	72
Moisture of burning hydrogen	594	605
Carried away in dry gases	2,355	2,436
Incomplete combustion of carbon	127	221
Radiation and other losses	1,782	2,263
Heat balance, per cent.:		
Absorbed by boiler	68.21	63.63
Loss of heat due to:		
Moisture in fuel	0.25	0.47
Moisture of burning hydrogen	3.86	3.93
Carried away in dry gases	15.29	15.83
Incomplete combustion of carbon	0.82	1.44
Radiation and other losses	11.57	14.70

Test No. 178: No. 14—The coal burned rapidly and caked in the fire. Steam was used in the ash pit during the afternoon. The clinker was easily removed during the first cleaning; in the second cleaning it adhered to the grate and was difficult to remove. Automatic air admission was operated.

Test No. 181: No. 14—The coal burned rapidly and caked. When the test was started 290 pounds of crushed limestone was spread over the grate to prevent the clinker from melting into it as it did on test

178. Free ash formed on the grate; it was easily removed. The percentage of clinker in the refuse was not determinable. Automatic air admission was operated.

PRODUCER-GAS TEST.

The following producer-gas test is taken from U. S. Geological Survey Bulletin 290, page 205:

Test 54, West Virginia No. 14.

Size as shipped, run of mine. Size as used, not determined. Duration of test, 47 hours.

Average electrical horse-power	201.3
Average B. T. U. gas, per cubic foot	147.0
Total coal fired, pounds	9,750.

Coal consumed in Producer (Pounds per Horse-power per hour).

	Test 54.		
	Coal as fired	Dry Coal	Combustible
Per electrical horse-power:			
Available for outside purposes	[illegible]	1.05	1.02
Developed at switchboard	1.03	1.00	0.97
Per brake horse-power:			
Available for outside purposes	0.92	0.89	0.87
Developed at engine	0.87	[illegible]	0.82
Equivalent used by producer plant:			
Per electrical horse-power:			
Available for outside purposes	1.15	1.12	1.08
Developed at switchboard	1.10	1.06	1.03
Per brake horse-power:			
Available for outside purposes	0.98	0.95	0.92
Developed at engine	0.93	0.90	0.88

Analyses.

Coal.	Test 54.	Gas by volume.	Test 54.
Moisture	3.12	Carbon dioxide (CO_2)	8.6
Volatile Matter	28.99	Carbon monoxide (CO)	20.7
Fixed Carbon	65.22	Hydrogen (H_2))	13.3
Ash	2.67	Methane (CH_4)	2.3
		Nitrogen (N_2)	55.1
Total	100.00		
Sulphur	1.21	Total	100.0

See also Bureau of Mines Bulletin 13, pages 221 and 270 for results of producer-gas tests.

COKING TESTS.

The following coking tests are taken from U. S. Geological Survey Bulletin 290, page 206:

Test 20, West Virginia No. 14.

Size as shipped, run-of-mine. Size as used, finely crushed. Raw. Duration of test, 71 hours.

Coal charged (pounds)	11,000
Coke produced (pounds)	7,154
Breeze produced (pounds)	364
Coke produced (per cent.)	65.04
Breeze produced (per cent.)	3.31
Total percentage yield	68.35

Remarks—Good, hard coke. Foundry coke. Light-gray and silvery color. High yield due to deposited carbon.

Analyses, Test 20.

	Coal.	Coke.
Moisture	1.04	0.38
Volatile Matter	29.28	0.96
Fixed Carbon	66.80	95.19
Ash	2.88	3.47
Sulphur	1.04	0.94

Additional coking tests of coal from this mine (**No. 79 on Map II**) are taken from U. S. Geological Survey Bulletin 336, pages 25, 34, and 44, and published along with **Mine No. 51** in the **No. 2 Gas Coal (Test 21)** as also the details of a test (No. 23) made of a mixture of the **No. 2 Gas and Eagle Coals from Mines Nos. 51 and 79.**

Cupola Test (No. 20) of coke made from a mixture of the **No. 2 Gas** and **Eagle Coals** from the above-mentioned mines, as taken from U. S. Geological Survey Bulletin 336, pages 52, 55, 57, 61 and 64, are given in this report under the description of **Mine No. 51,** pages 545-548.

Mt. Carbon Co., Ltd., Coal Opening—No. 382 on Map II.

On branch of Johnson Fork of Loop Creek, 1.7 miles S. 50° W. of Kincaid; **Eagle Coal**; elevation, 1730′ B.; examined by author.

	Feet.	Inches.
Coal, digging closed, reported by A. L. Fipps, a native, to have a thickness of	4	0

Loop Creek Estate Coal Opening—No. 382A on Map II.

On head of branch of Beards Fork, 2.0 miles N. 50° E. of Page; **Eagle Coal**; elevation, 1600′ ±; section by C. E. Krebs.

			Feet.	Inches.
Coal, (slate roof)	1′	0″		
Slate	0	6		
Coal	1	7		
Slate	0	1		
Coal	0	3		
Slate	0	1		
Coal (slate floor)	2	7½	6	1½

Coal Exposure—No. 383 on Map II.

In edge of hill road, 2 miles south of Kincaid; **Eagle Coal**; elevation, 1950′ B.; for stratigraphic position see Head of Johnson Fork Section, page 163; examined by author.

	Feet.	Inches.
Shale, sandy	18	0
Coal blossom, heavy	2	0
Sandstone	30	0

The **Loop Creek Estate Coal Prospect—No. 384 on Map II**, on west hillside of Ingram Branch, ½ mile south of Hamilton, at an elevation of 2020′ L., is in the **Eagle Coal** according to C. E. Krebs; no section of bed obtained.

The **Loop Creek Estate Coal Prospect—No. 385 on Map II**, on point, south side of Loop Creek, 0.9 mile southeast of Hamilton, at an elevation of 1974′ L., is also in **Eagle Coal** according to the same authority.

Paint Creek Colliery Co. "Hickory Camp" Mine—(Abandoned)—No. 80 on Map II.

On east hillside of Paint Creek, ¼ mile east of Hickory Camp; **Eagle Coal**; elevation, 1355′ L.; section at drift mouth by Teets.

			Feet.	Inches.
1. Shale, sandy				
2. **Coal**	1′	10″		
3. Slate and fire clay	2	0		
4. **Coal**	1	3		
5. Slate, gray	0	3		
6. **Coal**	0	3		
7. Slate, and shale	0	5		
8. **Coal**, visible	3	0	9	0
9. Concealed by water				

Nos. 5, 6, and 7 are reported to reach a thickness of 20 inches at some places in this mine.

The author also measured a section and took two samples of the coal at this mine in 1907 as published by Dr. White on page 341 of Volume II(A) of the Survey, as follows:

			Feet.	Inches.
1. Sandstone				
2. Draw slate			1	3
3. **Coal,** cannelly	0′	3″		
4. **Coal,** soft	1	3		
5. Slate, gray	0	4		
6. **Coal,** hard	0	3		
7. Slate, gray	0	8		
8. **Coal,** soft (slate floor)	3	1	5	10

"Butts, N. 75° E.; faces, N. 15° W.; greatest rise, S. 15° E.; mine capacity, 280 tons; men employed, 40; coal shipped east and west for general fuel and steam purposes; sample from Nos. 4 and 8, and also from No. 8 only, the analyses of which were published under Nos. 19 and 20 in Table No. 3, page 348, of Volume II(A), and republished by him under the same numbers on page 257 of Bulletin 2."

These analyses are republished in the present report under **Mine No. 80** in Table 1 at the end of this Chapter.

Christian Colliery Co. No. 1 Mine—No. 81 on Map II.

On west hillside of Paint Creek, ½ mile southeast of Hickory Camp; **Eagle Coal;** elevation, 1432′ L.; section by Teets.

			Feet.	Inches.
Coal, (not mined) (slate roof)			2	0
Slate and shale			3	5
Coal, gas	1′	3½″		
Slate, gray, 0¾″ to	0	0½		
Coal	0	2		
Slate	0	5		
Coal, gas (slate floor)	3	0½	4	11½

The following section was given A. M. Hagan by R. B. Whitaker, General Manager, in 1918:

			Feet.	Inches.
Coal (slate roof)	1′	6″		
Slate	0	7		
Coal	3	3	5	4

The following section was measured by A. M. Hagan in 1918:

				Feet.	Inches.
1.	Shale				
2.	**Coal**, soft	1′	6″		
3.	Shale, blue, hard	4	0		
4.	Bone	0	1		
5.	**Coal**, block	1	4		
6.	Slate	0	0½		
7.	**Coal**, sulphurous	0	2½		
8.	Slate	0	3½		
9.	**Coal**, good	1	7		
10.	Bone	0	3		
11.	**Coal**	1	2	10	5½
12.	Slate, soft, floor				

"Coal owned by Christian Colliery Co.; principal office, Charleston, W. Va.; daily capacity, 500 tons; daily output, 500 tons; 40 laborers and 55 miners employed; motor haulage; used for by-product purposes; shipped west; Sample No. 939H collected on 2nd South Butt entry, ¾ mile from crop, from Nos. 5, 9, 10, and 11 of section; butts, S. 75° W.; faces, N. 15° W.; greatest rise, southeast; authority for mine data, R. B. Whitaker, General Manager; started operation in 1911. Nos. 6, 7, and 8 are not mined."

The analysis of the sample collected by Mr. Hagan, as reported by Messrs. Hite and Krak, is given under **Mine No. 81** in Table 1 at the end of this Chapter.

Eagle By-Products Coal Co. No. 1 Mine—No. 81A on Map II.

On east hillside of Paint Creek, 0.3 mile northeast of Krebs; **Eagle Coal**; elevation, 1630′ L.; section by A. M. Hagan.

			Feet.	Inches.
Bone (shale roof)	0′	6″		
Coal	1	3		
Shale, 6″ to	1	2		
Coal, good (slate floor)	2	11	5	10

"Coal owned by Eagle By-Products Coal Co.; principal office, Charleston, W. Va.; daily capacity, 100 tons; daily output, 70 tons; 15 laborers and 23 miners employed; mule haulage; section measured 150 feet from mine mouth on main entry; started operation in 1917; authority for mine data, Alf Cox, Assistant Foreman."

The following section was measured by C. E. Krebs at the above mine and he also submitted a sample of the coal for analysis the results of which, as reported by Messrs. Hite and Krak, are given under **Mine No. 81A** in Table 1 at the end of this Chapter:

			Feet.	Inches.
Coal, gas (slate roof)	1′	2″		
Shale, gray	0	7		
Coal, gas (slate floor)	2	10	4	7

Milburn Coal Co. Mine—No. 82 on Map II.

On head of Skitter Creek, 1.7 miles due west of Kingston; **Eagle Coal**; elevation, 1879′ L.; for stratigraphic position see Kingston—1.7 miles West Section, page 165; section by Teets in 1916.

			Feet.	Inches.
Sandstone, visible			15	0
Coal	1′	4″		
Slate	2	2		
Coal	0	2		
Slate	0	8		
Coal (slate floor)	4	4	8	8

"Principal office, Milburn, W. Va.; used for by-product and domestic purposes; shipped west; lease coal from W. Va. Coal Land Co.; daily capacity, 1500 tons, daily output; 900 tons; 80 miners and 125 day men, 75 work as production men; Company was organized in 1913; electric haulage; D. H. Mornton, General Manager, authority for mine data."

The following section was measured and mine data collected by A. M. Hagan in February, 1918:

				Feet.	Inches.
1.	Shale roof				
2.	**Coal**, soft	1′	7 ″		
3.	Shale	0	1		
4.	**Coal**, hard	2	3		
5.	Shale	0	2		
6.	**Coal**, hard	1	0		
7.	Parting	0	0¼		
8.	**Coal**, hard	1	0	6	1¼
9.	Shale, soft				

"Coal owned by Milburn By-Products Coal Co.; principal office, Indianapolis, Ind.; daily capacity, 2000 tons; daily output, 700 tons; 40 laborers and 45 miners employed; motor haulage; used for by-product purposes; shipped west; greatest rise, S. 55° E.; sample No. 936H collected from Nos. 2, 4, 6, 7, and 8 of section, on 1st Left, 800 feet from entry; authority for mine data, Thomas Green, Mine Foreman."

The analysis of the sample collected by Mr. Hagan, as reported by Messrs. Hite and Krak, is given under **Mine No. 82** in Table 1 at the end of this Chapter.

Solvay Collieries Co.—Westerly No. 1 Mine—No. 83 on Map II.

On south hillside of Paint Creek, ¾ mile southwest of Keeferton; **Eagle Coal**; elevation, 1880′ B.; section and data by Teets in 1916.

			Feet.	Inches.
Coal, gas (slate roof)	4′	1″		
Slate	0	1		
Coal (slate floor)	2	8	6	10

"The above section was measured in the right rib opposite slate hole frog. Principal office, Syracuse, N. Y.; General Manager's office, Kingston, W. Va.; shipped east and west; used for by-product purposes; 80 miners and 70 laborers employed; daily capacity, 1500 tons; daily output, 750 tons; Milburn Coal & Coke Co. operated this seam from about 1909 to April, 1913, when the Solvay Collieries Co. bought them out; James M. Smyth, Mine Foreman, authority for mine data."

The following section was measured by A. M. Hagan in February, 1918, and the appended mine data secured by him when sampling the coal for analysis:

				Feet.	Inches.
1.	Shale				
2.	**Coal**, soft	1′	10″		
3.	Bone	0	1		
4.	Parting	0	0⅛		
5.	**Coal**, hard	1	8		
6.	**Coal**, soft	0	9		
7.	**Coal**, hard	2	5	6	9⅛
8.	Shale, blue, floor				

"Daily capacity, 700 tons; daily output, 700 tons; 41 laborers and 55 miners employed; electric motor haulage; greatest rise, S. 55° E.; sample No. 933H collected from Nos. 2, 4, 5, 6, and 7 of section, in 16th room on 10th Left, 3000 feet from crop; authority for mine data, F. H. Morton, Superintendent; started operation in 1910."

The analysis of this sample, as reported by Messrs. Hite and Krak, is given under **Mine No. 83** in Table 1 at the end of this Chapter.

Solvay Collieries Co. No. 5 Mine—No. 84 on Map II.

On head of Milburn Creek, 1.2 miles southwest of Kingston; **Eagle Coal**; elevation, 2005′ B.; section by Teets, in 1916.

			Feet.	Inches.
Coal (slate roof)	1′	10″		
Slate, gray	0	1		
Coal, blocky	1	6		
Coal, soft	1	0		
Coal, blocky, (slate floor)	2	9	7	2

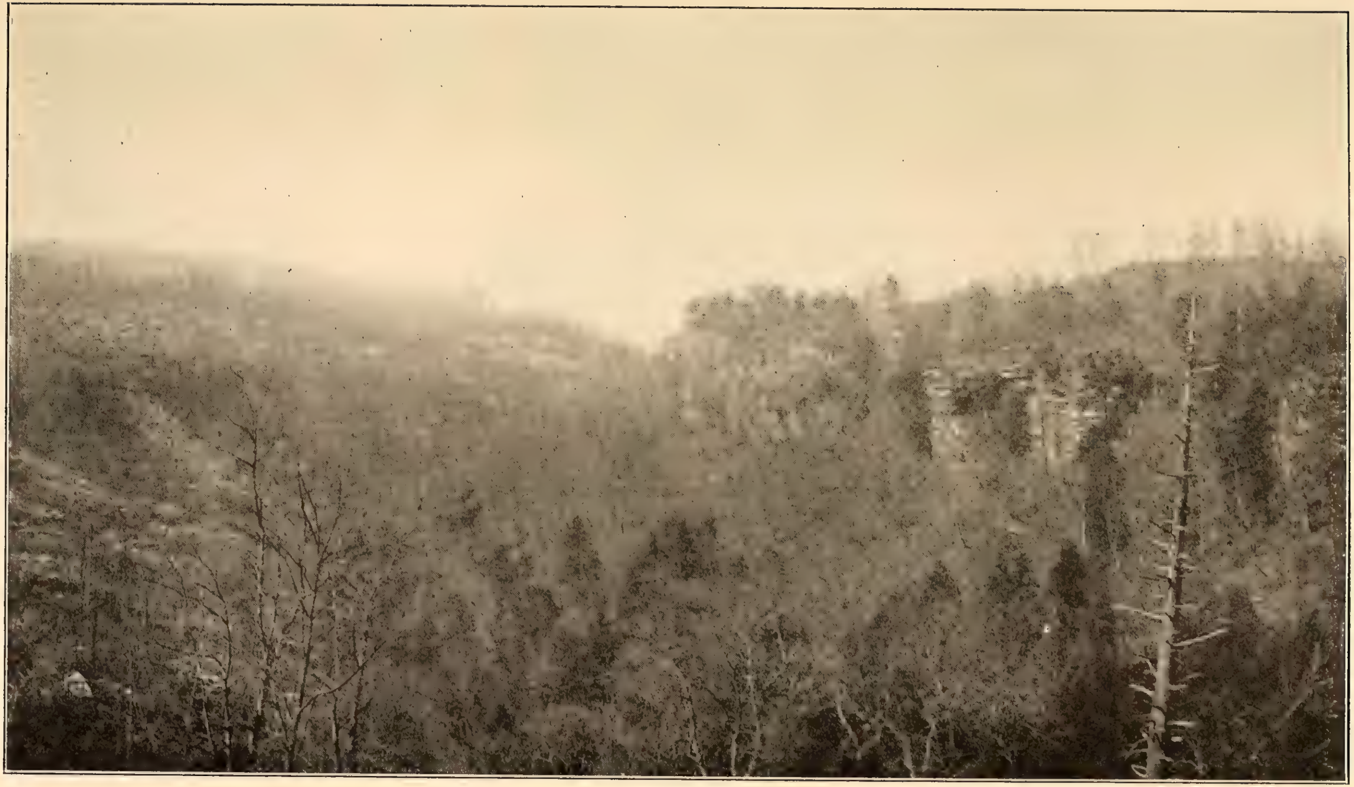


PLATE XXI.—View 1 mile northward from Landisburg, looking northwest down Manns Creek and showing cliffs of Upper Raleigh Sandstone on right and ground strewn with boulders of latter on left.

The following section was measured by A. M. Hagan at the above mine in February, 1918:

				Feet.	Inches.
1.	Shale, slaty, blue				
2.	Coal, soft	1′	11 ″		
3.	Slate, black, 0½″ to	0	0¾		
4.	Coal, bone, 0½″ to	0	1½		
5.	Coal, soft	2	4		
6.	Coal, hard	2	9		
7.	Slate	0	0¼		
8.	Coal, hard	0	6	7	8½
9.	Shale, black			0	4
10.	Slate				

"Coal owned by Solvay Collieries Co.; principal offices, Syracuse, N. Y., and Huntington, W. Va.; daily capacity, 1000 tons; daily output, 800 tons; 40 laborers and 125 miners employed; motor haulage; shipped west for by-product purposes; main dip, N. 55° W.; sample No. 931H collected by A. M. Hagan from Nos. 2, 5, 6, 7, and 8 of section at face of 9th Right, 2000 feet from crop; operation began in 1914; authority for mine data, F. H. Morton, General Manager and Superintendent."

The analysis of this sample, as reported by Messrs. Hite and Krak, is given under Mine No. 84 in Table 1 at the end of this Chapter.

Solvay Collieries Co. No. 3 Mine—No. 85 on Map II.

On head of Milburn Creek, 1.3 miles southwest of Kingston; **Eagle Coal**; elevation, 2021′ L.; section measured near drift mouth by Teets.

			Feet.	Inches.
Coal (slate roof)	1′	3″		
Slate	0	2		
Coal, block	1	3		
Coal, soft	1	0		
Coal (slate floor)	2	0	5	8

Solvay Collieries Co. No. 1 Mine—No. 86 on Map II.

On east hillside of Milburn Creek, 0.7 mile south of Kingston; **Eagle Coal**; elevation, 2033′ L.; section by Teets near drift mouth.

			Feet.	Inches.
Coal, (slate roof)	1′	8″		
Slate	0	1		
Coal, gas	5	0	Eagle 6	9
Slate, and concealed (by hand-level)			103	0
Shale, Eagle, marine fossils				

Teets reports that the slate parting in the above seam thickens at some places in this mine to 2 feet.

Solvay Collieries Co. No. 1A Mine—No. 87 on Map II.

On west hillside of Bishop Branch, 1 mile S. 20° E. of Kingston; **Eagle Coal**; elevation, 2036′ L.; section by Teets.

			Feet.	Inches.
Coal (slate roof)	1′	3″		
Slate, 7″ to	0	1		
Coal, (slate floor)	4	6	5	10

Solvay Collieries Co. No. 2 Mine—No. 88 on Map II.

On east hillside of Milburn Creek, 1.2 miles south of Kingston; **Eagle Coal**; elevation, 2036′ L.; section by Teets near drift mouth, in 1916.

			Feet.	Inches.
Coal, (slate roof)	1′	4″		
Slate	0	1		
Coal, gas, (slate floor)	5	0	6	5

The following section was measured by A. M. Hagan in February, 1918, at the above mine:

				Feet.	Inches
1.	Sandstone roof				
2.	**Coal**, soft	1′	8″		
3.	Bone, 1″ to	0	2		
4.	**Coal**, soft	2	3		
5.	**Coal**, hard (slate floor)	2	9	6	10

"Coal owned by Solvay Collieries Co.; principal office, Syracuse, N. Y.; headquarters, Huntington, W. Va.; daily capacity, 1000 tons; daily output, 950 tons; 50 laborers and 85 miners employed; mule and motor haulage; shipped west for by-product purposes; greatest rise, S. 55° E.; sample No. 937H collected by A. M. Hagan from Nos. 2, 3, 4, and 5 of section in 2nd Left 'B'; F. H. Morton, authority for mine data; started operation in 1910."

The analysis of this sample, as reported by Messrs. Hite and Krak, is given under **Mine No. 88** in Table 1 at the end of this Chapter.

Milburn Coal Co. Prospect Opening—No. 88A on Map II.

On point, south side of Paint Creek, 1.8 miles due west of Keeferton. **Eagle Coal**; elevation, 1675′ ± B.; section by R. B. Whitaker.

			Feet.	Inches.
Coal	1′	4″		
Slate	1	6		
Coal	3	3	6	1

Milburn Coal Co. Prospect Opening—No. 88B on Map II.

On point, south side of Paint Creek, 1.4 miles S. 75° W. of Keeferton; **Eagle Coal**; elevation, 1825′ L.; section by R. B. Whitaker.

			Feet.	Inches.
Coal (sandstone roof)	1′	6″		
Fire clay	2	9		
Coal	3	5	7	8

Fayetteville District.

In Fayetteville District, the Eagle Coal, as shown on Figure 15 and Map II, is confined to several scattered areas in the western third of the District. Its thickness and stratigraphic position are exhibited in the sections published in Chapter IV for Sugar Creek, Parral, Potato Hill Knob, and Herberton, pages 185, 186, 191, and 194, respectively. It has been prospected here considerably by natives for local domestic fuel and by the large land-holding companies. It has also been operated at two commercial mines on Paint Creek along the line of the Virginian Railway. Its description at these openings and other exposures follows.

Solvay Collieries Co. Coal Prospect—No. 386 on Map II.

On head of Bishop Branch, ½ mile N. 15° W. of Town Creek Knob; **Eagle Coal**; elevation, 2109′ L.; section by Solvay Collieries Co.

			Feet.	Inches.
Coal	1′	9″		
Fire clay	0	1		
Coal	2	0½		
Fire clay	0	0½		
Coal	1	6½	5	5½

Coal Opening—No. 387 on Map II.

On head of Town Creek, 2¾ miles northwest of Herberton; **Eagle Coal**; elevation, 2205′ L.; examined by author.

			Feet.	Inches.
Shale, gray and brown, visible			6	0
Coal, soft, gray, columnar	1′	10″		
Shale, gray, soft, 3″ to	0	5		
Coal, medium-soft, columnar	2	1	4	4
Slate				

Long Branch Coal Co. (Abandoned) Mine—No. 89 on Map II.

On northeast slope of Potato Hill Knob, 2½ miles northwest of Herberton; **Eagle Coal**; elevation, 2230′ B.; for stratigraphic position see Potato Hill Knob Section, page 191; examined by author.

					Feet.	Inches.
1.	Sandstone, visible				6	0
2.	**Coal**, soft	0′	7″			
3.	Slate, black, **coal** streaks	1	6			
4.	**Coal**, slaty	1	2	**Eagle "A"**	3	3
5.	Shale, buff, sandy, iron ore nodules				8	0
6.	**Coal, soft, Eagle,** with 2″ to 4″ parting of slate just above middle				4	0
7.	Slate					

No. 6 not exposed outside but given by W. S. Kelly, Foreman. The Eagle mine has only temporarily been abandoned until the No. 2 Gas Coal is mined out

Coal Opening—No. 388 on Map II.

On southeast slope of Potato Hill Knob, 2¼ miles northwest of Herberton; **Eagle Coal**; elevation, 2220′ B.; examined by author.

	Feet.	Inches.
Coal, opening closed, 3′ 0″ to	4	0

Willis Branch Coal Co. (Abandoned) Mine—No. 90 on Map II.

On west hillside of Paint Creek, ¾ mile west of Herberton; **Eagle Coal**; elevation, 2476′ L.; section by author, 50 feet in.

			Feet.	Inches.
Shale, sandy, mass of calamite fossil plants and other plants, visible			2	0
Coal, soft, columnar	1′	6″		
Mother **coal**	0	1		
Coal, soft, columnar	1	10	3	5
Shale, sandy			5	0

This mine had been temporarily abandoned on account of financial difficulties, only about 60 acres being worked out of the 1600 owned.

In 1908, Dr. I. C. White published the following information concerning this mine, as given on page 342 of Volume II(A):

"The coal has recently been opened up on the property of the McKinley Land Company, by the Herbert Collieries Company, at Herberton and there Mr Hennen secured the following data:

				Feet.	Inches.
1.	Slate, gray				
2.	Draw slate			0	6
3.	**Coal**, soft	1′	10″		
4.	**Coal**, gray and hard	0	4		
5.	**Coal**, soft, (slate floor)	2	0	4	2

"Faces, irregular; greatest rise, southeast; mine capacity, 400 tons; men employed, 60; coal shipped east and west for steam; sample from Nos. 3, 4, and 5, the analysis of which was published under No. 23 in Table No. 3, page 348 of Volume II(A) and republished by Dr. White under the same number on page 257 of Bulletin 2."

This analysis is given under **Mine No. 90** in Table 1 at the end of this Chapter.

The bed was also measured and sampled at three points by A. M. Hazelwood, of the U. S. Geological Survey, on August 16, 1909, as described on pages 925 and 926 of Bulletin 22 of the U. S. Bureau of Mines:

Section A (sample 8903) was cut from pillar No. 1 on right entry 1, 400 feet north of drift mouth; thickness 3′ 11½″ coal.

Section B (sample 8904) was cut from the face of the main entry, 1500 feet northwest of the drift mouth; thickness 3′ 7½″ coal.

Section C (sample 8905) was cut from the face of room 21, off left entry 1, 1,200 feet west of the drift mouth; thickness 4′ 1″ coal.

A **composite sample** was made by mixing samples 8903, 8904, and 8905. The results of an ultimate analysis of this sample are shown under laboratory **No. 8937.**

These analyses, as taken from page 231 of Bulletin 22 of the U. S. Bureau of Mines, are given under **Mine No. 90** in Table 3 at the end of this Chapter.

"**Notes.**—The coal at this mine was undercut with hand picks; two-thirds was shot down with a short-flame explosive and one-third with black powder. There were no screens, the entire output being loaded as run-of-mine coal. The coal was cleaned by one picker as it was loaded on the car. The rated capacity of the mine in 1909 was 630 tons per day, the average daily output being 400 tons and the maximum day's run 650 tons. The output of the mine was to be gradually increased, the coal to be derived from advance work. This mine had 1,700 acres of unmined coal."—p. 926.

Loup Creek Colliery Co. Coal Opening—No. 389 on Map II.

On east hillside of Goode Hollow, 2.6 miles northeast of Kingston; **Eagle Coal**; elevation, 2075′ B.; examined by Teets.

			Feet.	Inches.
Coal (slate roof)	2′	9″		
Slate and bone	0	10		
Coal (slate floor)	2	8	6	3

Gallier Coal Co. Coal Opening—No. 390 on Map II.

On head of Long Branch, 2 miles N. 25 E. of Mossy; **Eagle Coal**; elevation, 2150′ B.; examined by Teets.

			Feet.	Inches.
Coal (slate roof)	2′	10″		
Slate	0	10		
Coal (slate floor)	2	9	6	5

Mason Coleman (Abandoned) Coal Opening—No. 391 on Map II.

On north hillside of Lick Fork of Mossy Creek, ½ mile north of Coleman School; **Eagle Coal**; elevation, 2210′ B.; examined by Teets.

	Feet.	Inches.
Coal, Eagle, opening closed and abandoned, reported to be 6′ 0″ to	7	0
Interval	30	0
Coal, Little Eagle, visible	2	6

Coal Prospect—No. 392 on Map II.

On south hillside of Lick Fork of Mossy Creek, 0.6 mile east of Coleman School; **Eagle Coal**; elevation, 2325′ B.; examined by author.

				Feet.	Inches.
Coal, soft	3′	0″			
Shale, gray	0	5			
Coal, soft	2	2			
Slate, gray	5	0			
Coal, soft	2	2	**Eagle**	12	9
Shale, gray and concealed, and shale, gray				22	0
Coal, soft, Little Eagle				2	4

Stuart Colliery Co. Coal Opening—No. 393 on Map II.

On head of Whiteoak Fork, 0.8 mile north of Parral (Summerlee); **Eagle Coal**; elevation, 2365′ B.; for stratigraphic position, see Parral Section; examined by author.

	Feet.	Inches.
1. Sandstone, visible	10	0
2. **Coal, Eagle,** several thick partings	13	0

The above section is as published by Dr. White on page 334 of Volume II(A) from information collected by the author in connection with Mine No. 93 on Map II in the Little Eagle Coal, a description of which is given later in this report under Mine No. 93 on Map II.

For the stratigraphic position of **Coal Exposure No. 394 on Map II,** in hill trail, head of Sugar Creek, 1¾ miles N. 50° W. of Fayetteville, at an elevation of 2065′ B., in the **Eagle Coal,** see Sugar Creek of Laurel Section, page 185.

Quantity of Eagle Coal Available.

Based on the evidence given on preceding pages and a planimetric determination of the area from Map II, as limited on Figure 15, by A. M. Hagan, the following estimate is made by the author of the probable amount of Eagle Coal available in Fayette County:

Probable Amount of Eagle Coal.

District	Thickness of Coal Assumed. Feet.	Square Miles.	Acres.	Cubic Feet of Coal.	Short Tons of Coal.
Falls	3.0	57.53	36,819.2	4,811,533,056	192,461,322
Kanawha	4.5	56.16	35,942.4	7,045,429,248	281,817,170
Mountain Cove...	3.0	4.22	2,700.8	352,940,544	14,117,622
Fayetteville	4.0	5.16	3,302.4	575,410,176	23,016,407
Totals for County.....		123.07	78,764.8	12,785,313,024	511,412,521

THE LITTLE EAGLE COAL.

The Little Eagle Coal, described briefly in Chapter VI, pages 262-263, is believed to attain minable dimensions—18 inches and upwards—throughout the region of its occurrence in Fayette County, as shown on Figure 16. As a separate bed it has only been mined commercially at a single operation (No. 93 on Map II) within the County, although as mentioned on page 629 under the description of Coal Exposure No. 380 on Map II, it is worked in the same mining section with the Eagle bed in the Kingston and Keeferton regions. It has also been prospected considerably by natives for local domestic fuel and by the large land-holding companies. Its

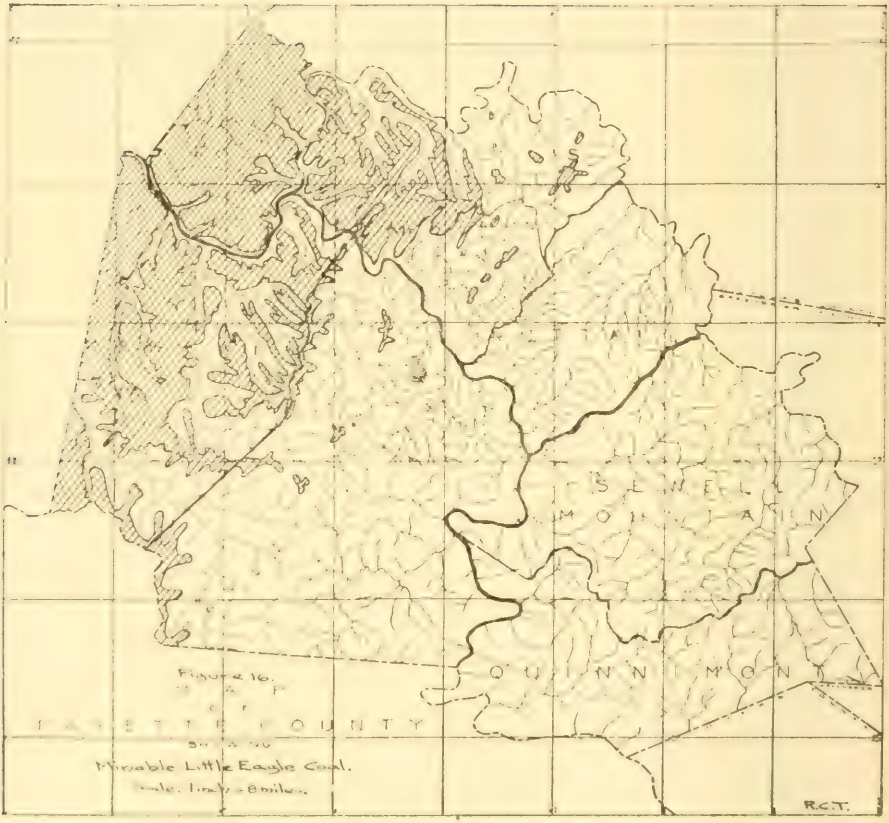


Figure 16.
MAP
OF
FAYETTE COUNTY
SHOWING
Minable Little Eagle Coal.
Scale, 1 inch = 8 miles.

thickness and character at these openings and other exposures will now be described by magisterial districts.

Falls District.

In Falls District, the Little Eagle Coal has never been mined commercially but it outcrops above drainage, except in the northwest border northward from the Kanawha River, thus making it accessible to drift openings throughout a wide region. Its thickness and stratigraphic position are exhibited in the sections published in Chapter IV for Smithers, Boomer —¾ Mile East, Belva—0.7 Mile South, Albion—Woods Ferry, Peters Creek, and Deitz, page references to which are given in the Index. It has been prospected considerably by natives for local domestic fuel for which it has an excellent reputation. Its description at these diggings and other exposures follows.

K. & M. R. R. Coal Exposure—No. 91 on Map II.

On point east bank of Smithers Creek at Smithers; **Little Eagle Coal**; elevation, 639′ L.; used in Smithers Section, page 122; examined by Teets.

	Feet.	Inches.
Sandstone, flaggy, visible	15	0
Shale, slaty, gray, marine fossils	5	0
Coal, Little Eagle, splinty	1	11
Shale, gray, sandy, plant fossils	4	0
Sandstone, flaggy, to railroad grade	4	0

The analysis of a sample collected by Teets at the above exposure, as reported by Messrs. Hite and Krak, is given under **Mine No. 91** in Table 1 at the end of this Chapter.

Coal Opening—No. 395 on Map II.

On east hillside of Rich Creek, opposite mouth of Lick Branch; **Little Eagle Coal**; elevation, 1005′ B.; examined by Teets.

	Feet.	Inches.
Coal, Little Eagle, (in some places) about	1	4

Gauley Mountain Coal Co. Coal Opening—No. 396 on Map II.

On west hillside of Lick Branch of Rich Creek, 1.4 miles south of Jodie; **Little Eagle Coal**; elevation, 1070′ B.; examined by Teets.

	Feet.	Inches.
Shale, sandy		
Coal, gas, (slate floor)	2	10

Gauley Mountain Coal Co. Coal Opening—No. 397 on Map II.

On east hillside of Rich Creek, opposite mouth of Bridge Fork; **Little Eagle Coal**; elevation, 1135′ B.; section as reported to Teets by Gauley Mountain Coal Company.

	Feet.	Inches.
Sandstone		
Coal (slate floor)	2	4

Coal Opening—No. 398 on Map II, in ravine, south side of Gauley River, ½ mile southwest of mouth of Sugar Creek, at an elevation of 1440′ B., in the **Little Eagle Coal,** examined by author, was closed and thickness not learned.

C. C. Harrah Coal Opening—No. 399 on Map II.

On east hillside of Horseshoe Creek, 0.4 mile southeast of Gauley River; **Little Eagle Coal**; elevation 1760′ B.; examined by author

	Feet.	Inches.
Coal, opening closed, reported by Mr. Harrah, clean, with a thickness of	2	6

A. N. Steele Coal Opening—No. 400 on Map II.

On west hillside of Horseshoe Creek, 0.9 mile southeast from Gauley River; **Little Eagle Coal**; elevation, 1615′ B.

	Feet.	Inches.
Sandstone, visible	4	0
Coal, medium-soft, columnar, (slate, gray, floor)	2	6

The coal here has a great reputation for domestic fuel, but could not get sample for analysis on account of water.

Widow Burns Heirs Coal Opening—No. 401 on Map II.

On west hillside of Horseshoe Creek, 1 mile southeast from Gauley River; **Little Eagle Coal**; elevation, 1625′ B.; examined by author.

	Feet.	Inches.
Coal, clean, reported (opening closed)	2	6

Coal Exposure—No. 401A on Map II.

In hill hoad, 0.4 mile southwest of Mulvane; **Little Eagle Coal**; elevation, 1820′ B.; examined by author.

	Feet.	Inches.
Coal, in road, with slate top and bottom	1	10

Lawrence Harrah Coal Opening—No. 402 on Map II.

On west side of knob, 1¼ miles N. 40° E. of mouth of Horseshoe Creek; **Little Eagle Coal**; elevation, 1715′ B.

	Feet.	Inches.
Shale, dark, argillaceous, roof		
Coal, clean	2	6

Riley Forbis Coal Opening—No. 403 on Map II.

On east side of knob, 1.3 miles N. 40° E. of mouth of Horseshoe Creek; **Little Eagle Coal**; elevation, 1705′ B.; examined by author.

			Feet.	Inches.
Coal (shale roof)	0′	1″		
Shale, dark	1	6		
Coal, soft (slate floor)	2	6	4	1

Kincaid & Conley Coal Opening—No. 92 on Map II.

On east side of ridge, 0.8 mile N. 60° W. of Ramsey; **Little Eagle Coal**; elevation, 1830′ B.

	Feet.	Inches.
Shale, buff, argillaceous, visible	2	0
Coal, gas, medium-soft, (slate, gray, floor)	2	1

The analysis of sample (913H) collected by the author 100 feet in the above mine, as reported by Messrs. Hite and Krak, is given under **Mine No. 92** in Table 1 at the end of this Chapter.

The results obtained for this sample as also those for that from Exposure No. 91 on Map II, described on a preceding page, indicate a coal of great excellence, approaching in calorific value the famous coals of the New River Group.

Mountain Cove District.

In Mountain Cove District, the Little Eagle Coal has been prospected so little that the information concerning its thickness and regularity is somewhat meager, but it is believed to average 18 inches and upwards in thickness, or sufficient to warrant its classification as minable in the area shown on Figure 16. Its thickness and stratigraphic position are exhibited in the Ansted—Hawks Nest and Mulvane—1 Mile Southwest Sections, published in Chapter IV, pages 171 and 173, respectively. The only other exposures observed in the District are the two described next below.

Gauley Mountain Coal Co. Tramroad—Coal Exposure—No. 404 on Map II.

In coal railroad grade, ½ mile due north of Ansted; **Little Eagle Coal**; elevation, 1630' B.; examined by the author.

	Feet.	Inches.
Shale, sandy, visible	5	0
Shale, black, **Lingula fossils** abundant	1	0
Coal, gas	0	9
Shale, gray	5	0

Coal Opening—No. 405 on Map II.

On east side of hill road, 1¼ miles N. 15° E. of Victor; **Little Eagle Coal**; elevation, 1765' B.; examined by author; digging closed, thickness concealed.

Kanawha District.

In Kanawha District, the Little Eagle Coal, as shown on Figure 16, covers a wide area. It also attains a fair development, especially in the southern border on the headwaters of Armstrong Creek and on Paint Creek, in the latter region being operated in commercial mines in the same mining section with the Eagle bed. Its thickness and stratigraphic position in this District are exhibited in the sections published in Chapter IV for Mt. Carbon, Deepwater, Kimberly, Beckwith, Columbia—1.2 Miles Southwest, Elk Ridge, Powellton—½ Mile Northwest, Powellton, Head of Powellton Fork, Page and Kingston, page references to which are given in the Index. It has been prospected considerably by the large land-holding companies. Its description at these diggings and other exposures follows.

Coal Prospect—No. 406 on Map II.

In ravine, south hillside of Kanawha River, 2.4 miles southwest of Kanawha Falls; **Little Eagle Coal**; elevation, 1280' B.; examined by author.

	Feet.	Inches.
Shale, buff, sandy, visible	1	0
Coal, gas, medium soft	2	0
Slate, gray, and concealed	3	0
Sandstone, [illegible]	25	0

Coal Prospect—No. 407 on Map II.

On north hillside of Kanawha River, 0.6 mile due south of No. 406; **Little Eagle Coal**; elevation, 1345′ B.; examined by Teets.

	Feet.	Inches.
Coal and slate	2	2

Loup Creek Colliery Co. Prospect—No. 408 on Map II.

On west hillside of Mulberry Fork, 2.4 miles northwest of Ford Knob; **Little Eagle Coal**; elevation, 1575′ B.; section as reported to Teets; opening fallen shut.

			Feet.	Inches.
Coal, (slate roof)	1′	0″		
Slate	0	7		
Coal	2	11	4	6

Coal Exposure—No. 380 on Map II.

On head of Powellton Fork; **Little Eagle Coal**; (See same number for Eagle Coal); elevation, 1480′ B.; for stratigraphic position see Head of Powellton Fork Section, page 162; examined by author.

	Feet.	Inches.
Shale, sandy	13	0
Coal, soft, columnar	2	3
Shale, gray	1	9
Sandstone, to railroad grade	7	0

Coal Exposure—No. 409 on Map II.

In hill road at head of Dempsey Branch, 2.9 miles S. 60° W. of Cotton Hill; **Little Eagle Coal**; elevation, 1715′ B.

	Feet.	Inches.
Coal, (sandstone roof and slate floor)	2	9

Coal Exposure—No. 410 on Map II.

In hill road at head of Fails Creek, 2.2 miles southeast of Kanawha Falls; **Little Eagle Coal**; elevation, 1660′ B.; examined by Teets.

			Feet.	Inches.
Slate, visible			5	0
Coal, gas	1′	2″		
Bone	0	2		
Coal (slate floor)	0	9	2	1

Coal Exposure—No. 411 on Map II.

On west bank of Left Fork of Armstrong Creek; ½ mile up former stream; **Little Eagle Coal**; elevation, 1430′ B.; examined by author.

	Feet.	Inches.
Shale, sandy and flaggy, visible	15	0
Coal, gas, bright, medium-soft	2	4
Shale	3	0
Sandstone	3	0
Shale to bed of Armstrong Creek	3	0

Coal Exposure—No. 379 on Map II.

On east bank of Left Fork of Armstrong Creek; **Little Eagle Coal**; (See same number for Eagle Coal); elevation, 1650′ B.; examined by author.

	Feet.	Inches.
Shale, buff, argillaceous	4	4
Coal, gas, medium-soft	2	4
Fire clay shale to creek	[illegible]	0

Fayetteville District.

In Fayetteville District, the Little Eagle Coal, as shown on Figure 16, is confined to several scattered areas in the northwestern third of the District. Its thickness and stratigraphic position are exhibited in the sections published in Chapter IV for Fayetteville—1.5 Miles Northwest, Sugar Creek, and Parral, pages 183, 185, and 186, respectively. It was once mined commercially in the ridge northwest of Parral and it has been prospected considerably by natives for local domestic fuel. Its description at these openings and other exposures follows.

Martin Wilson Coal Opening—No. 412 on Map II.

On head of Marr Branch, 1.9 miles N. 40° W. of Fayetteville; **Little Eagle Coal**; elevation, 2015′ B.; examined by author.

			Feet.	Inches.
Sandstone, current-bedded, coarse, brown, micaceous, visible			4	0
Coal, gas, medium-soft, 4″ to	0′	5″		
Slate, black, siliceous, 2″ to	0	3		
Coal, soft, columnar, 22″ to	2	0	2	8
Fire clay shale, grayish-white			2	0

Coal Opening—No. 413 on Map II.

On head of Sugar Creek, edge of trail, 1.8 miles northwest of Fayetteville; **Little Eagle Coal**; elevation, 2015′ B.; examined by author.

			Feet.	Inches.
Sandstone, visible			6	0
Shale, sandy, 0″ to			1	6
Coal, gas, medium-soft	0′	7″		
Bone	0	1		
Coal, soft, columnar (slate floor)	1	10	2	6

Coal Exposure—No. 414 on Map II.

In hill road, 1.3 miles S. 70° W. of Cotton Hill; **Little Eagle Coal,** elevation, 1720′ B.; examined by Teets.

			Feet.	Inches.
Sandstone, visible			15	0
Slate			2	0
Coal	1′	4″		
Slate	0	2		
Coal, gas	0	7	2	1

Coal Opening—No. 415 on Map II.

On head of Orchard Branch of Laurel, 0.9 mile due east of Big Rock Knob; **Little Eagle Coal;** elevation, 1775′ B.; examined by author.

						Feet.	Inches.
Sandstone, flaggy and shaly, visible						5	0
Coal, gas, medium-soft			1′	1″			
Slate, black	0′	1 ″					
Coal	0	0½	0	3			
Slate, black	0	0½					
Coal, soft, columnar			3	0	**Little Eagle**	4	4
Slate and concealed						40	0
Slate, flaggy and sandy						50	0
Concealed						10	0
Shale, black, **Eagle,** marine fossils						5	0
Sandstone, **Lower War Eagle,** coarse, brown						50	0

E. B. Hawkins Coal Opening—No. 416 on Map II.

On south side of Cassidy Branch of Laurel, 0.8 mile N. 75° E. of Ford Knob; **Little Eagle Coal;** elevation, 1825′ B.; examined by author.

			Feet.	Inches.
Shale, plant fossils, buff, argillaceous and siliceous, visible			12	0
Coal, soft, columnar	0′	3″		
Shale, gray	0	3		
Coal, soft, columnar	0	4		
Shale, dark-gray	0	2		
Coal, soft, columnar	1	0		
Bony slate, black	0	1		
Coal, soft, columnar (slate floor)	2	0	4	1

Coal Opening—No. 417 on Map II, on east side of ridge, 1 mile due south of Ford Knob, **Little Eagle Coal,** elevation, 1930′ B., examined by author; closed, thickness not learned.

Loup Creek Colliery Co. Coal Opening—No. 418 on Map II.

On northeast side of ridge, 1.35 miles S. 5° E. of Ford Knob; **Little Eagle Coal**; elevation, 1950′ B.; examined by author.

				Feet.	Inches.
Sandstone, roof					
Coal, soft, columnar	0′	3 ″			
Slate, black, 0″ to	0	0⅛			
Coal, soft, columnar (slate floor)	3	7	...	3	10⅛

Stuart Colliery Co. "Beech Creek" Mine (Abandoned)—No. 93 on Map II.

On south side of ridge, ¾ mile N. 15° W. of Parral (Summerlee); **Little Eagle Coal**; worked out and abandoned in 1911; elevation, 2325′ B.; section at entrance, by author; for stratigraphic position see Parral Section, page 186.

				Feet.	Inches.
Sandstone, visible				5	0
Coal, gas, medium-soft	0′	2½″			
Coal, slightly bony	0	1			
Coal, gas, medium-soft	0	6½			
Bony slate, black, ½″ to	0	1			
Coal, soft, columnar (slate floor)	2	8	...	3	7

The author also measured a section of the coal at this mine in 1907 as published by Dr. White on page 334 of Volume II(A) of the Survey, as follows:

					Feet.	Inches.
1.	Sandstone, visible				10	0
2.	**Coal, Eagle**, several thick partings				13	0
3.	Concealed				35	0
4.	Draw slate, 8″ to				0	4
5.	**Coal**, gas, soft	0′	9 ″			
6.	Slate, black	0	0¼			
7.	**Coal**, soft	2	8	**Little Eagle**	3	5¼
8.	Concealed (interval corrected)				1120	0
9.	**Coal, Sewell**, in Parral Shaft				4	2

Greatest rise, S. 40° E.; butts, N. 70° E.; capacity of mine, 100 tons; men employed, 22; coal shipped mostly east for steam purposes; authority for mine data, Lawson Blenkinsopp, Superintendent; sample from Nos. 5, 6, and 7, the analysis of which was published by Dr. White under No. 9 in Table No. 3, page 347, of Volume II(A), and republished by him under the same number on page 257 of Bulletin 2.

This analysis is given under **Mine No. 93** in Table 1 at the end of this Chapter.

The bed was also measured and sampled (No. 8173) by David White, Chief Geologist of the U. S. Geological Survey, on July 9, 1909, at face of right heading 2,900 feet from the drift mouth, as published on pages 938-9 of Bulletin 22, of the U. S. Bureau of Mines, the analysis of same being published on page 236 of the same Bulletin. This analysis is republished under **Mine No. 93** in Table 3 at the end of this Chapter.

G. W. Perry Coal Opening—No. 419 on Map II.

On head of Sugar Branch, 1 mile due north of Parral (Summerlee); **Little Eagle Coal**; elevation, 2320′ B.; examined by author.

			Feet.	Inches.
Sandstone, massive, rather coarse-grained, micaceous, buff, visible			5	0
Slate, gray, soft			1	3
Coal, medium-soft	0′	7 ″		
Slate, black	0	0¼		
Coal (slate floor)	2	8¾	3	4

Coal Prospect—No. 392 on Map II.

On south hillside of Lick Fork of Mossy Creek, 0.6 mile east of Coleman Schoolhouse; **Little Eagle Coal**; elevation, 2300′ B., (See same number for mine in Eagle Coal); examined by author.

	Feet.	Inches.
Shale, gray, and concealed and gray shale from **Eagle Coal**	22	0
Coal, soft, Little Eagle	2	4

Coal Exposure—No. 420 on Map II, in hill road, 1¾ miles due west of Fayetteville; **Little Eagle Coal**; elevation, 2090′ B., represented by blossom in road.

Coal Exposure—No. 421 on Map II.

In ridge road, 2¼ miles due west of Fayetteville; **Little Eagle Coal**; elevation, 2115′ B.

	Feet.	Inches.
Sandstone, coarse, brown	35	0
Concealed	7	0
Coal blossom, heavy	3	0
Fire clay shale and concealed		

Quantity of Little Eagle Coal Available.

Based on the foregoing evidence and a planimetric determination by A. M. Hagan of the area as limited on Figure 16 from Map II, the following estimate is made by the author for the probable amount of Little Eagle Coal available in Fayette County:

Probable Amount of Little Eagle Coal.

District.	Thickness of Coal Assumed, Feet.	Square Miles.	Acres.	Cubic Feet of Coal.	Short Tons of Coal.
Falls	1.5	58.91	37,702.4	2,463,474,816	98.538,993
Kanawha	2.0	58.16	37,222.4	3,242,815,488	129,712,619
Mountain Cove.....	1.5	4.50	2,880.0	188,179,200	7,527,168
Fayetteville	2.5	4.12	2,636.8	287,147,520	11,485,901
Totals for County	....	125.69	80,441.6	6,181,617,024	247,264,681

THE GLENALUM TUNNEL COAL.

The Glenalum Tunnel Coal, described briefly in Chapter VI, pages 268-269, appears to attain minable dimensions and regularity in Fayette only in the southeast border of Kanawha and the northwestern half of Fayetteville Districts, as shown in detail on Figure 17. It has never been mined commercially in the County but it has been prospected to some extent by natives and large land-holding companies. It is an excellent steam and domestic fuel coal and possesses a calorific value closely approaching that of the beds of the New River Group as will be readily seen in Table 1 of coal analyses at the end of this Chapter. Its thickness and character at the several diggings and exposures observed are described below by magisterial districts.

Kanawha District.

In Kanawha District, the Glenalum Tunnel Coal, in minable development, appears to be confined to the southeast border on the headwaters of Loop Creek and on Paint Creek. Its thickness and stratigraphic position are exhibited in the sections published in Chapter IV for Elk Ridge, Powellton—½ Mile Northwest, Powellton, Keeferton—½ Mile West, and Kingston, page references to which are given in the Index; and in test wells for oil and gas Nos. 11 and 12 on Map II, the logs of which are published on pages 350 and 351, respectively. The following opening and exposure were examined by the author:

Coal Opening—No. 422 on Map II.

On south bank, ⅛ mile up Jenkins Fork of Armstrong Creek; **Glenalum Tunnel Coal**; elevation, 860′ B.

	Feet.	Inches.
Shale, buff, siliceous, visible	10	0
Concealed, holding **coal**, 2′ 0″ to	3	0
Sandstone, massive, to creek	30	0

Coal Exposure—No. 423 on Map II.

On west bank of Armstrong Creek, 0.6 mile southwest from mouth of Powellton Fork; **Glenalum Tunnel Coal**; elevation, 960′ B.

	Feet.	Inches.
Shale, sandy, visible	8	0
Coal, gas	1	6
Shale	1	0
Sandstone, makes cliff, **Lower Gilbert**	30	0
Concealed to bed of Armstrong Creek	30	0

Fayetteville District.

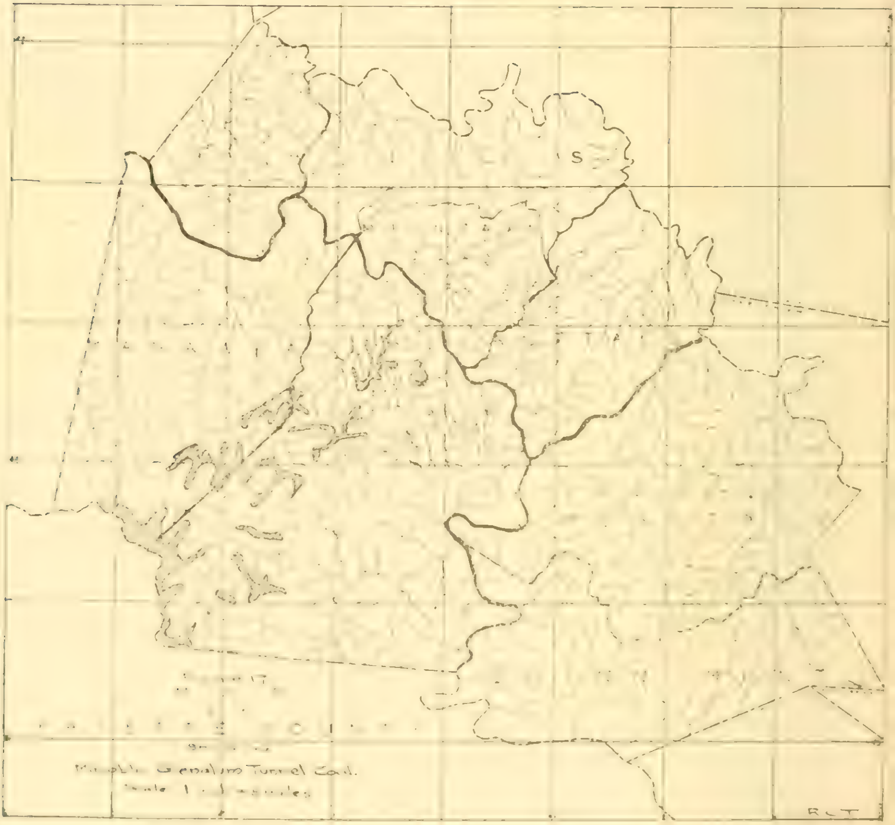
In Fayetteville District, the Glenalum Tunnel Coal, in minable thickness and regularity, is represented by several scattered areas in the northwestern half of the District as exhibited in detail on Figure 17. Its thickness and stratigraphic position here are shown in the sections published in Chapter IV for Carlisle, Potato Hill Knob, and Herberton, pages 189, 191, and 194, respectively. It has been prospected here both by natives and large land-holding companies as shown in the following openings:

Coal Opening—No. 94 on Map II.

End of private road, ¾ mile S. 70° E. of Potato Hill Knob and 2 miles northwest of Herberton; **Glenalum Tunnel Coal**; elevation, 1985′ B.; for general stratigraphic position, see Potato Hill Knob Section, page 191.

	Feet.	Inches.
Shale, visible	1	0
Coal, soft, columnar (slate floor)	2	4

The analysis of a sample (908H) collected by the author at the opening, as reported by Messrs. Hite and Krak, is given under **Mine No. 94** in Table 1 at the end of this Chapter. The calorimetric result for this sample is surprising in that it shows over 15,000 B. T. U. per pound of coal, ranking it along with the best coals of the New River and Pocahontas Groups.


S
PACIFIC OCEAN
Tunnel Coal.
RLT

McKinley Land Co. Coal Opening—No. 95 on Map II.

On county line, ¾ mile S. 50° W. of Herberton; **Glenalum Tunnel Coal**; elevation, 2180′ B.; for general stratigraphic position, see Herberton Section, page 194.

	Feet.	Inches.
Sandstone, visible	3	0
Slate, sandy, 0″ to	0	5
Coal, soft, columnar, resembling New River type, 3′ 0″ to	3	5
Slate		

The analysis of a sample (909H) collected by the author at the above opening, as reported by Messrs. Hite and Krak, is given under **Mine No. 95** in Table 1 at the end of this Chapter.

Coal Opening—No. 424 on Map II.

On west hillside of Peach Bottom Branch, 1 mile S. 50° W. of Carlisle; **Glenalum Tunnel Coal**; elevation, 2235′ B.; examined by author.

	Feet.	Inches.
Sandstone, shaly, visible	8	0
Shale, sandy	1	6
Coal, soft, columnar	2	7
Shale, sandy, visible	1	0

M. P. Mahoney Coal Opening—No. 425 on Map II.

On north side of Fork Ridge, ¾ mile S. 60° W. of Carlisle; **Glenalum Tunnel Coal**; elevation, 2220′ B.; for general stratigraphic position see Carlisle Section, page 189; examined by author.

	Feet.	Inches.
Coal, opening closed, reported soft and fine, according to J. W. Mahoney, burning to a white ash, with a thickness of	3	0

New River Co. Coal Opening—No. 426 on Map II.

On branch of Mossy Creek, 2.4 miles due west of Bishop; **Glenalum Tunnel Coal**; elevation, 2100′ B.; section as given the author by Wm. Toney who once worked it; opening closed.

	Feet.	Inches.
Slate roof		
Coal, medium-hard (burning to white ash)	2	4
Slate		

Quantity of Glenalum Tunnel Coal Available.

Based on all the data in hand and a planimetric determination by A. M. Hagan of the apparent minable area of the

Glenalum Tunnel bed from Map II as it is limited on Figure 17, the following estimate is made by the author of the probable amount of this coal available in Fayette County:

Probable Amount of Glenalum Tunnel Coal.

District	Thickness of Coal Assumed. Feet.	Square Miles.	Acres.	Cubic Feet of Coal.	Short Tons of Coal.
Kanawha	1.5	7.67	4,908.8	320,740,992	12,829,639
Fayetteville	2.0	11.26	7,206.4	627,821,568	25,112,863
Totals for County...	....	18.93	12,115.2	948,562,560	37,942,502

THE GILBERT COAL

The Gilbert Coal, described briefly in Chapter VI, page 271, appears to attain minable dimensions throughout the region indicated for it by the shading on Figure 18. Its outcrop is shown in detail on Map II throughout the region of its occurrence, including the localities where it is too thin to have any economic importance. Although never mined commercially in Fayette, it has been operated by natives quite extensively for local domestic fuel. Its excellent character as a steam and domestic fuel coal is attested by the following average results from 5 samples collected in Wyoming County, published on page 721 of the Wyoming-McDowell Report of the State Survey:

	Per cent.
Moisture	0.61
Volatile Matter......................	27.84
Fixed Carbon........................	63.61
Ash	7.94
Total	100.00
Sulphur	1.51
Phosphorus	0.018

The foregoing average analysis of Gilbert Coal from the southern portion of the State shows a higher fixed carbon and sulphur content than found for the two samples collected in Fayette, the analyses of which are given in Table 1 at the end of this Chapter.

Falls District.

In Falls District, the Gilbert Coal, in minable development, is confined to the eastern portion mostly in Dogwood Ridge and its intimately associated spurs as shown on Figure 18 and Map II. Its thickness and stratigraphic position in the District as a whole are exhibited in the sections published in Chapter IV for Gamoca and Albion—Woods Ferry, pages 131 and 140, respectively. It has been opened quite extensively, especially in the Dogwood Ridge region, by natives for local domestic fuel for which it bears an excellent reputation. Its description at these diggings and other exposures follows.

C. C. Harrah Coal Opening—No. 427 on Map II.

On east hillside of Horseshoe Creek, ½ mile southeast from Gauley Bridge; **Gilbert Coal**; elevation, 1525′ B.; examined by author.

	Feet.	Inches.
Coal, opening closed, reported	1	8

Charles Hess Coal Opening—No. 428 on Map II.

On west hillside of Laurel Creek, northeast side of road, 1¼ miles N. 70° E. of Horseshoe Creek; **Gilbert Coal**; elevation, 1510′ B.: examined by author.

	Feet.	Inches.
Shale, sandy, visible	2	0
Coal, soft, columnar	1	1
Shale, gray, soft	0	7
Coal, thickness concealed		

Coleman Heirs Coal Opening—No. 429 on Map II.

On head of Horseshoe Creek, ½ mile S. 25° W. of Mulvane; **Gilbert Coal**; elevation, 1580′ B.; examined by author.

	Feet.	Inches.
Coal, opening closed, reported by W. F. Minter who says many sled-loads of coal were hauled from here for domestic fuel, but he did not remember about partings	1	10

Coal Opening—No. 430 on Map II.

On north edge of road, ⅛ mile northwest of Albion, in Nicholas County; **Gilbert Coal**; elevation, 1420′ B.; examined by author.

	Feet.	Inches.
Coal, opening closed, comes on top of 40 feet of coarse, brown, friable sandstone (Dotson)	..	..

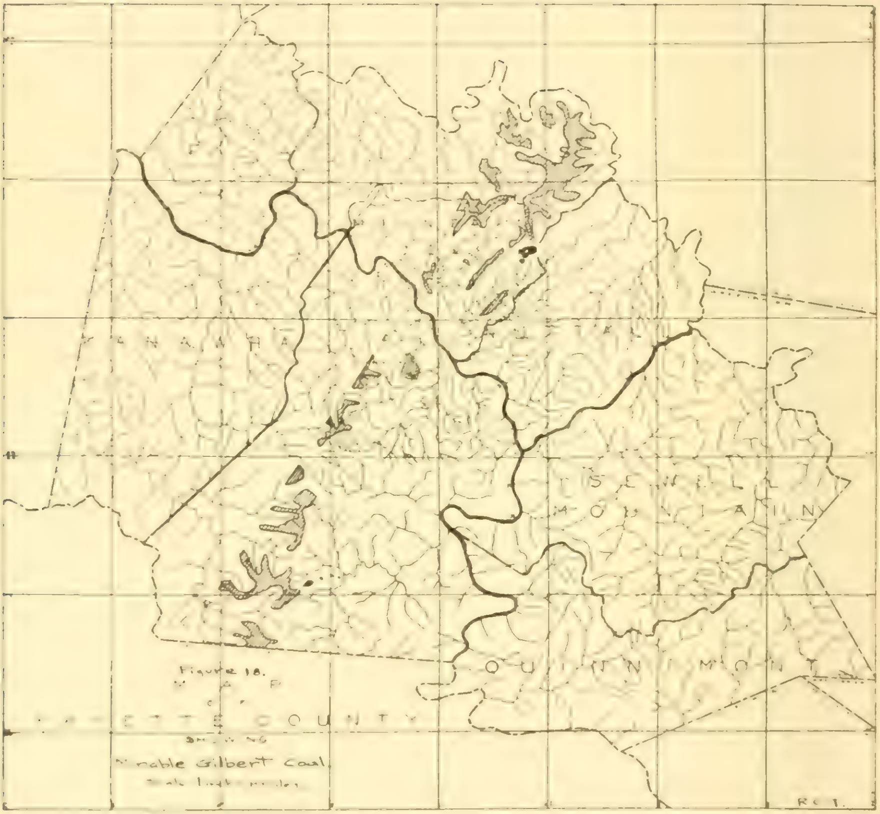


Figure 18.
MAP
OF
SHOWING
Minable Gilbert Coal
Scale [illegible] miles

O. W. Mason Coal Opening—No. 431 on Map II.

In Nicholas County, north hillside of Gauley River, 0.9 mile N. 30° E. of Albion; **Gilbert Coal**; elevation, 1410′ B.; for general stratigraphic position see Albion-Woods Ferry Section, page 140; examined by author.

			Feet.	Inches.
Shale, buff, sandy			9	0
Shale, bluish-black, plant fossils abundant			1	3
Coal, soft	0′	11½″		
Slate, gray	0	0½		
Coal, soft (slate floor)	0	6	1	6

L. F. Cavendish Coal Opening—No. 432 on Map II.

In branch of Laurel, northwest side of Dogwood Ridge, 1.5 miles S. 75° W. of Ramsey; **Gilbert Coal**; elevation, 1850′ B.; examined by author.

	Feet.	Inches.
Shale, buff, sandy, visible	15	0
Coal, opening closed, reported by Mr. Cavendish 33″ to 36″ thick, with 1″ to 2″ bone just below middle	3	0

About 14 inches of soft, columnar coal of the top portion is visible on outside, but full height is not shown on account of slip.

Coal Opening—No. 433 on Map II, on north edge of road, west side of Dogwood Ridge, 2.6 miles S. 70° W. of Carnifex Ferry; **Gilbert Coal**; elevation, 1855′ B.; examined by the author, was closed, and thickness not learned.

Coal Opening—No. 434 on Map II, on east side of Dogwood Ridge, 2.4 miles S. 40° W. of Carnifex Ferry; **Gilbert Coal**; elevation, 1865′ B.; examined by author, was closed and thickness not learned.

Joseph Hawkins Coal Opening—No. 435 on Map II.

On east side of Dogwood Ridge, 2 miles S. 70° W. of Carnifex Ferry; **Gilbert Coal**; elevation, 1815′ B.; examined by author.

			Feet.	Inches.
Shale roof, visible			2	0
Coal, soft, columnar	1′	4″		
Coal, bony	0	4		
Coal, medium-hard (slate floor)	1	5	3	1

W. C. Reynolds Coal Opening—No. 436 on Map II.

On east side of Dogwood Ridge, 2 miles S. 70° W. of Carnifex Ferry; **Gilbert Coal**; elevation, 1815′ B.; examined by author.

			Feet.	Inches.
Shale, buff, argillaceous, roof, visible			2	0
Coal, soft, columnar	1′	1″		
Slate, streak, $\frac{1}{16}$″ to	0	0		
Coal, soft, columnar	0	6		
Coal, bony	0	4		
Coal, medium-hard (slate, gray, floor)	1	5	3	4

This mine is now furnishing a large supply of domestic fuel for the farmers in the surrounding region.

Mary A. Bolar Coal Opening—No. 437 on Map II.

In Nicholas County, north side of road, 1.4 miles N. 85° E. of Keslers Crosslanes; **Gilbert Coal**; elevation, 1705′ B.; examined by author.

			Feet.	Inches.
Shale, dark, sandy, visible			12	0
Coal, soft, columnar	1′	1 ″		
Shale, gray	0	0½		
Coal, soft	0	1½		
Shale, gray, **coal** streak	0	6		
Coal, bony	0	5		
Coal, medium-hard, columnar	2	5	4	7
Slate				

The above opening occurs 50 feet above Opening No. 453 in the Douglas Coal.

Mountain Cove District.

In Mountain Cove District, the Gilbert Coal, in minable development, appears to be confined to the southeastern two thirds, as shown in detail on Figure 18. Its stratigraphic position is exhibited in the Ansted—Hawks Nest Section, page 172. It has been opened in this District quite extensively by farmers for local domestic fuel. Its description at these diggings follows.

Coal Opening—No. 438 on Map II.

On west hillside, ¼ mile northwest of Ansted; **Gilbert Coal**; elevation, 1430′ B.; examined by author.

	Feet.	Inches.
Shale	3	0
Coal, gas	1	4
Shale, gray	1	0

W. T. Hamilton Coal Opening—No. 439 on Map II.

On northwest hillside, 1 mile southwest of Ansted; **Gilbert Coal**; elevation, 1560′ B.; examined by Teets.

	Feet.	Inches.
Sandstone, roof		
Coal, opening fallen shut, reported	2	4

David W. Fox Coal Opening—No. 440 on Map II.

On south side of turnpike, 1.3 miles S. 85° E. of Mountain Cove; **Gilbert Coal**; elevation, 1830′ B.; examined by author.

				Feet.	Inches.
1.	Shale, sandy, visible			8	0
2.	**Coal**, soft, columnar	1′	2″		
3.	Shale, dark-gray	0	3		
4.	**Coal**, medium-hard	0	9	2	2
5.	Slate, gray, visible			1	0

No. 4 of section is reported very hard and exceptionally fine.

Henry Wilson Coal Opening—No. 440A on Map II.

On northwest side of high ridge, 0.9 mile S. 40° E. of Mountain Cove; **Gilbert Coal**; elevation, 1815′ B.; opening closed; section as reported to Teets.

			Feet.	Inches.
Coal, splint (slate roof)	1′	5″		
Slate, gray	1	10		
Coal, splint	1	6	4	9

It is very doubtful that the Gilbert Coal at the above opening carries splint coal, since its structure is usually of the soft and columnar type, characteristic of the beds in the New River and Pocahontas Groups and in the basal third of the Kanawha. It is often quite hard but even then is of the columnar type.

J. F. Neff Coal Opening—No. 96 on Map II.

On west side of ridge, 0.7 mile N. 70° W. of Hico; **Gilbert Coal**; elevation, 2100′ B.; examined by author.

			Feet.	Inches
1. Shale, roof				
2. **Coal**, soft, columnar	1′	1½″		
3. Shale, gray, soft, ¼″ to	0	0½		
4. **Coal**, medium-hard, blocky	1	2		
5. Slate, black, bony	0	0½		
6. **Coal**, medium-hard, blocky	0	11½	3	4

The analysis of a sample collected by the author from Nos. 2, 4, and 6 of section, as reported by Messrs. Hite and Krak, is given under **Mine No. 96** in Table 1 at the end of this Chapter.

MacNickell Coal Opening—No. 441 on Map II.

On east side of ridge, ½ mile N. 40° W. of Hico; **Gilbert Coal**; elevation, 2115′ B.; Butts, S. 75° W.; faces, S. 15° E.; examined by author.

			Feet.	Inches.
Coal, soft, columnar (shale roof)	1′	2 ″		
Shale, dark-gray, soft, ¼″ to	0	0½		
Coal, medium-hard	2	3	3	5½
Slate, gray, visible			0	6

Wm. E. Hawver Coal Opening—No. 442 on Map II.

On west side of Dogwood Ridge, 1 mile due south of Deitz; **Gilbert Coal**; elevation, 2090′ B.; examined by author.

			Feet.	Inches.
Sandstone, coarse, brown, soft, visible			2	0
Coal, medium-soft, columnar	0′	10″		
Coal, medium-hard, columnar	2	0	2	10
Shale			0	6
Sandstone, coarse, brown, soft				

Wm. E. Hawver Coal Opening—No. 443 on Map II, on west side of Dogwood Ridge, 0.15 mile southeast of Mine No. 442; **Gilbert Coal**; elevation, 2115′ B.; examined by author, was closed and thickness not learned.

Geo. Hawver Coal Opening—No. 97 on Map II.

On west side of Dogwood Ridge, 0.65 mile S. 15° E. of Deitz; **Gilbert Coal**; elevation, 2060′ B.; section at working face, by author.

					Feet.	Inches.
1.	Shale, sandy, roof					
2.	**Coal**, soft, columnar	1′	2 ″			
3.	Slate, dark-gray	0	$0\frac{1}{16}$			
4.	**Coal**, soft, columnar	0	4			
5.	**Coal**, splinty, hard	0	2			
6.	**Coal**, soft	0	3			
7.	**Coal**, splinty, hard	0	2			
8.	**Coal**, medium-hard, columnar	1	10	...	3	$11\frac{1}{16}$
9.	Shale, gray					

The entry is driven S. 20° E., and coal rises rapidly, being at least 10 feet higher, 200 feet in mine. Mr. Hawver reports the coal as burning with a clean, white ash. The analysis of a sample (911H) collected by the author entirely across the face of the mine, as reported by Messrs. Hite and Krak, is given under **Mine No. 97** in Table 1 at the end of this Chapter.

Mrs. W. H. Crawford Coal Opening—No. 444 on Map II.

On west side of ridge, 0.8 mile S. 45° E. of Graydon; **Gilbert Coal**; elevation, 1940′ B.; section reported to author by R. R. Crawford.

				Feet.	Inches.
Coal, soft (slate roof)	0′	6″			
Slate, bluish-white, hard	1	1			
Coal, soft (slate floor)	1	6	.....	3	1

Kanawha District.

In Kanawha District, the Gilbert Coal does not appear to attain minable dimensions and purity, and for this reason the area is designated as barren on Figure 18, but its outcrop is indicated on Map II. Its thickness and stratigraphic position are exhibited in the sections published in Chapter IV for Deepwater, Powellton—½ Mile Northwest, Powellton, Head of Johnson Fork, and Kingston, page references to which are given in the Index; and in the log of Coal Test Boring No. 13 in Map II, page 398. The three following exposures, all examined by the author, are within the limits of the District:

Coal Exposure—No. 445 on Map II.

On east bank of Armstrong Creek, at Elk Ridge; **Gilbert Coal**; elevation, 1005′ B.

				Feet.	Inches.
Coal, soft	0′	9″			
Coal, and slate, mixed	0	10	**Gilbert**	1	7
Shale	3′	0″			
Sandstone, shaly	5	0			
Shale	0	6			
Coal	0	2		8	8
Shale				1	0
Sandstone from railroad grade				15	0

Coal Exposure—No. 446 on Map II.

On east hillside of Powellton Fork, ½ mile northwest of Powellton Station; **Gilbert Coal**; elevation, 945′ B.; for general stratigraphic position see Powellton—½ Mile Northwest Section, page 157.

			Feet.	Inches.
Shale, bluish, sandy and flaggy			15	6
Coal, soft, columnar	1′	0″		
Shale, sandy	3	0		
Coal, slaty	0	6	4	6
Sandstone, **Dotson**, grayish-white and brown, current-bedded			35	0
Shale, bluish-black, laminated, iron ore nodules				

Coal Exposure—No. 447 on Map II.

On east hillside of Powellton Fork, 1 mile southeast of Powellton; **Gilbert Coal**; elevation, 1080′ B.

	Feet.	Inches.
Coal	1	3

Coal Exposure—No. 448 on Map II.

At foot of hill road, head of Johnson Fork, 1¾ miles south of Kincaid; **Gilbert Coal**; elevation, 1585′ B.; for general stratigraphic position see Head of Johnson Fork Section, page 163.

	Feet.	Inches.
Sandstone, shaly	5	0
Coal, soft, columnar, 1″ 0″ to	1	2
Fire clay shale	5	0
Sandstone		

Fayetteville District.

In Fayetteville District, the Gilbert Coal is believed to attain minable dimensions—18 inches and upwards—over the shaded area indicated for it on Figure 18. West of this shaded area its thickness and stratigraphic position are exhibited in the sections published in Chapter IV for Potato Hill Knob and Herberton, pages 192 and 194, respectively, as also in the two following openings:

Loup Creek Colliery Co. Coal Opening—No. 449 on Map II.

On head of Dempsey Branch, 1.7 miles N. 35° E. of Wriston; **Gilbert Coal**; elevation, 1660′ B.; examined by author.

	Feet.	Inches.
Coal, soft, 0′ to (shale roof)	1	0
Sandstone, **Dotson**, massive, coarse, brown, visible	25	0

Coal Exposure—No. 450 on Map II.

In hill road, 1 mile S. 50° W. of Cotton Hill; **Gilbert Coal**; elevation, 1495′ B.; examined by Teets.

			Feet.	Inches.
Coal, (slaty shale roof)	0′	7″		
Slate, gray	0	5		
Coal	0	3		
Slate, gray	0	6		
Coal (slate floor)	0	9	2	6

Boone Coal Co. (Mr. Kincaid) Coal Opening—No. 451 on Map II.

On head of Horse Creek, near low gap, west side of road, 2.4 miles N. 45° E. of Herberton; **Gilbert Coal**; elevation, 2225′ B.; examined by Teets.

	Feet.	Inches.
Shale, black, fossil plants	15	0
Coal, gas, columnar (slate floor)	4	7

Quantity of Gilbert Coal Available.

Based on all the data in hand, as also that given on preceding pages, and a planimetric determination from Map II by A. M. Hagan of the area as limited on Figure 18, the following estimate is made by the author of the probable amount of Gilbert Coal available in Fayette County:

Probable Amount of Gilbert Coal.

District.	Thickness of Coal Assumed. Feet.	Square Miles.	Acres.	Cubic Feet of Coal.	Short Tons of Coal.
Falls	2	7.15	4,576.0	398,661,120	15,946,445
Mountain Cove	2	3.59	2,297.6	200,166,912	8,006,676
Fayetteville	1.5	6.31	4,038.4	263,869,056	10,554,762
Totals for County	....	17.05	10,912.0	862,697,088	34,507,883

THE DOUGLAS COAL.

The Douglas Coal, described briefly in Chapter VI, pages 273-274, is quite generally present at the outcrop of its horizon throughout the County, but it appears to attain minable dimensions and regularity only in the southwest portion of Fayetteville District as shown on Figure 19. It is not mined commercially but it has been prospected to some extent by natives for local domestic fuel for which it has an excellent reputation. The following average analysis from 7 samples collected in Wyoming and McDowell Counties, taken from page 721 of the Wyoming-McDowell Report of the State Survey, gives a fair idea of its chemical composition in its type region of the State:

	Per cent.
Moisture	1.46
Volatile Matter	27.13
Fixed Carbon	67.38
Ash	4.03
Total	100.00
Sulphur	0.66
Phosphorus	0.012

The above average result is considerably higher in volatile matter and lower in phosphorus than obtained for the single sample collected in Fayette County (see No. 98 in Table 1 at end of this Chapter).

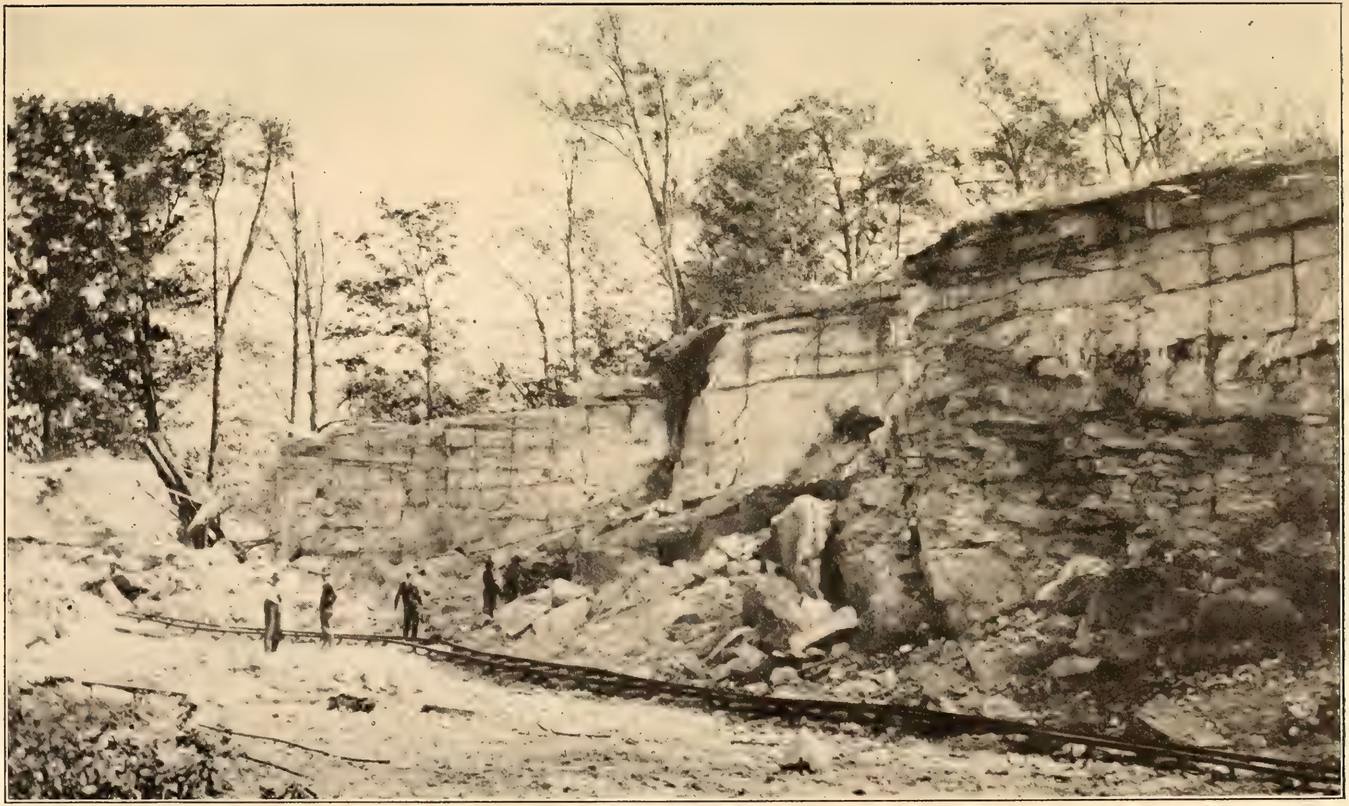


PLATE XXII.—View showing quarry of New River Silica Co., in Upper Raleigh Sandstone on east hillside of New River, ½ mile northeast of Ephraim (See Chapter XII for description.)

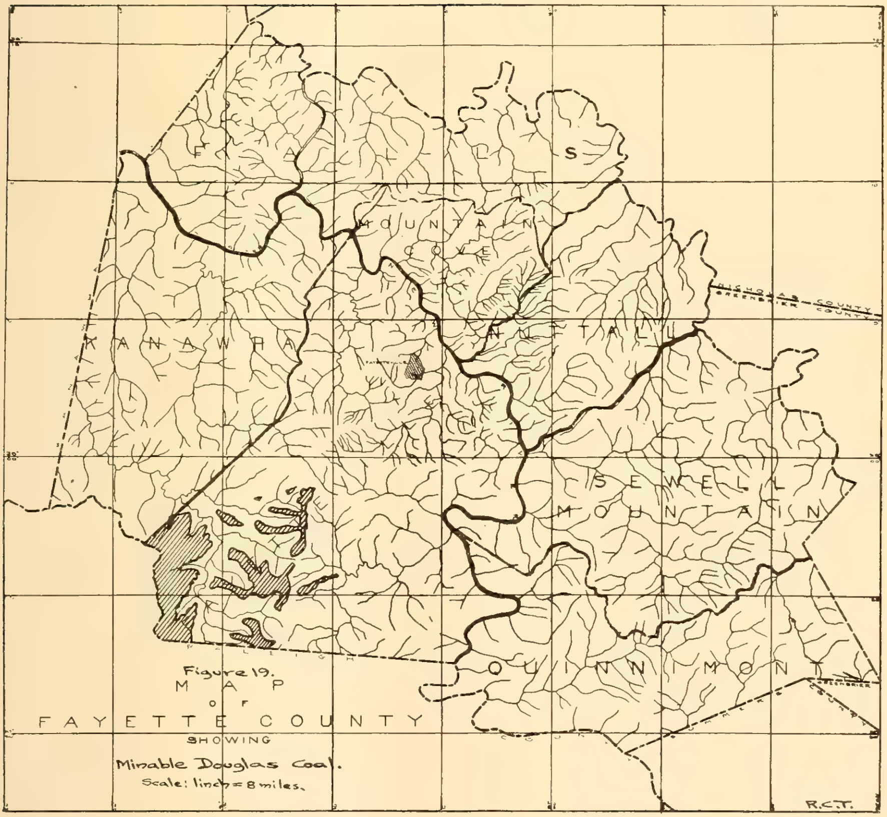


Figure 19.
MAP
of
FAYETTE COUNTY
SHOWING
Minable Douglas Coal.
Scale: 1 inch = 8 miles.

Falls District.

In Falls District, the Douglas Coal is not believed to attain minable dimensions and regularity. Its thickness and stratigraphic position are exhibited in the Panther Mountain Section, page 142, as also in the following exposure and opening:

Coal Exposure—No. 452 on Map II.

In road, 1.7 miles N. 20° W. of Ramsey; **Douglas Coal**; elevation, 1490′ B.; examined by author.

				Feet.	Inches.
Sandstone, coarse, brown, friable, **Dotson**, from top of knob				45	0
Shale, black-bluish, sandy				10	0
Sandstone				5	0
Shale and concealed				4	0
Coal, thickness concealed	0′	8″			
Shale	5	0			
Coal, slaty	0	4	**Douglas**	6	0
Fire clay shale				5	0
Shale, sandy, iron ore lenses				65	0
Coal, blossom, trace, Lower Douglas				0	6
Shale, to top of **Upper Nuttall Sandstone**				5	0

Mary A. Bolar Coal Opening—No. 453 on Map II.

In Nicholas County, north side of road, 1.4 miles N. 85° E. of Keslers Crosslanes; **Douglas Coal**; elevation, 1655′ B.; examined by author.

	Feet.	Inches.
Sandstone, coarse, brown, friable, **Dotson**		
Coal, thickness concealed, but reported clean, very black and bright, by Coleman Bolar	2	6

The above opening belongs 50 feet below Mine No. 437 in the Gilbert Coal.

Mountain Cove District.

In Mountain Cove District, the Douglas Coal it not believed to attain minable development. Its thickness and stratigraphic position are exhibited in the sections published in Chapter IV for Ansted—Hawks Nest and Mulvane 1 Mile Southwest, pages 172 and 173, respectively.

Kanawha District.

In Kanawha District, the Douglas Coal is present in practically the same development as in the area last described. Its thickness and stratigraphic position are exhibited in the sections published in Chapter IV for Deepwater, Keeferton—½ Mile West, and Kingston, pages 149, 164, and 167, respectively.

Fayetteville District.

In Fayetteville District, the Douglas Coal appears to attain minable dimensions over a considerable region in the southwest portion, as shown by the shaded area on Figure 19. Its thickness and stratigraphic position are exhibited in the sections published in Chapter IV for Fayetteville—1.5 Miles Northwest, Parral (Summerlee), Bishop—0.6 Mile Northwest, and Herberton (Willis Branch), pages 183, 186, 188, and 195, respectively; and in the log of Coal Test Boring No. 38 on Map II, page 186. The following data were obtained by the author at the old abandoned "Kidd" mine on this bed:

Lewis Kidd Coal Opening—No. 98 on Map II.

On bank of branch, ½ mile west of Herberton; Douglas Coal; elevation, 1945′ B.; for general stratigraphic position see Herberton Section, page 195.

			Feet.	Inches.
Shale, buff, sandy, flaggy, visible			8	0
Slate, dark, Lingula fossils abundant			3	0
Slate, black, cannelly, Lingula fossils abundant			0	6
Coal, soft, columnar	2′	6″		
Coal, slaty (slate floor)	0	6	3	0

The author also measured a section of the coal at the above mine in 1907 and collected a sample for analysis, as published by Dr. White on pages 326-7 of Volume II(A) of the Survey, as follows:

			Feet.	Inches.
Coal, hard	2′	5″		
Coal, slaty	0	4		
Coal, soft	0	3	3	0

This analysis is given under **Mine No.** 98 in Table 1 at the end of this Chapter. The coal at the above opening was erroneously correlated on page 326 of the volume last mentioned with the Lower War Eagle Coal, as will appear from the Herberton Section, page 195.

Quantity of Douglas Coal Available.

Based on all the data in hand, including that given on preceding pages, and a planimetric determination from Map II by A. M. Hagan of the area as limited on Figure 19, the following estimate is made by the author of the probable amount of Douglas Coal in Fayette County:

Probable Amount of Douglas Coal.

District.	Thickness of Coal Assumed. Feet.	Square Miles.	Acres.	Cubic Feet of Coal.	Short Tons of Coal
Kanawha	1.5	0.91	582.4	38,054,016	1,522,161
Fayetteville	2.0	14.38	9,203.2	801,782,784	32,071,311
Totals for County		15.29	9,785.6	839,836,800	33,593,472

MINABLE COALS OF THE NEW RIVER GROUP, POTTSVILLE SERIES.

As shown on Figure 4, page 387, only two of the thirteen coal beds recognized for the New River Group of the Pottsville Series in Fayette County appear to attain minable development; viz, the Sewell and Fire Creek. These two will now be described in the order given.

THE SEWELL COAL.

The Sewell Coal, described briefly in Chapter VII, pages 310-311, ranks first in economic importance and available tonnage among the 20 separate minable beds in Fayette. Its approximate minable area is shown on Figure 20, as also its western boundary line, west of which it has apparently thinned below minable dimensions. Its detailed outcrop is shown on Map II. It has long been mined on a commercial scale in this County where it yields a coal of great excellence for coking, steam, and domestic fuel purposes. The following average analysis, compiled by R. C. Tucker from 128 different analyses of samples collected in the southern half of the State and published in previous Reports of the W. Va. Geological Survey, gives a fair idea of its chemical composition and calorific value:

	Per cent.
Moisture	0.72
Volatile Matter	20.45
Fixed Carbon	75.31
Ash	3.52
Total	100.00
Sulphur	0.80
Phosphorus	0.007
Calorimeter B. T. U.	15,138

In addition to the 81 commercial mines that have been opened on the Sewell Coal within Fayette, the bed has been prospected extensively by natives for local domestic fuel and by the large land-holding companies. Its description at these mines, prospect openings and other exposures will now be given by magisterial districts as heretofore with other coals.

Falls District.

In Falls, the Sewell Coal in minable development as shown on Figure 20, is apparently confined to the eastern portion of the District. It lies below drainage everywhere except low down near the valley floor of Gauley River as shown in detail on Figure 20 and Map II. Here its thickness and stratigraphic position are exhibited in the sections published in Chapter IV for Horseshoe Creek, Peters Creek, Panther Mountain, and Carnifex Ferry, pages 137, 138, 142, and 143, respectively. Southward from Gauley River to the Mountain Cove District Line, even in the shaded area on Figure 20, information as to its thickness and regularity is lacking, owing to the absence of coal test borings. In this locality, as also

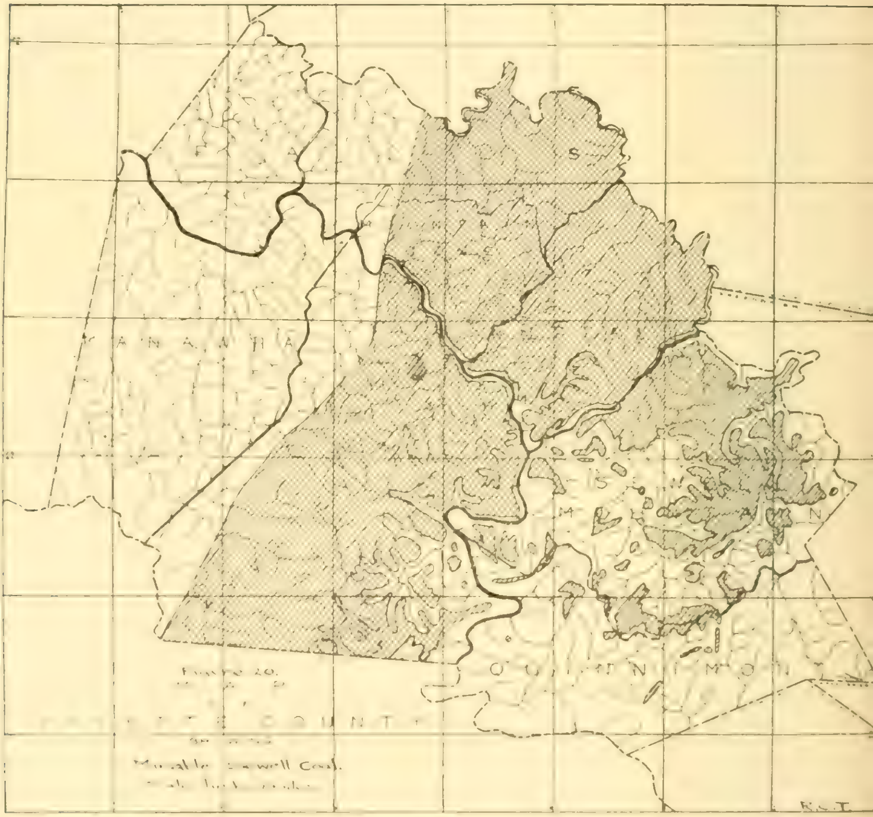


Figure 20.

Mineable Sewell Coal.

in the northeastern half of Nuttall District, the Sewell Coal appears to be more or less irregular in its bed section, but it is believed in Falls to average 30 inches in thickness, the dimension assumed in computing the table of estimates of available tonnage on a subsequent page.

The Sewell bed has never been mined commercially in Falls District but it has been prospected to some extent. Its description at these diggings and other exposures follows.

Matthews & Morton Farm Mine—No. 100 on Map II.

On south hillside of Gauley River, 0.1 mile above Horseshoe Creek; **Sewell Coal**; elevation, 905′ B.; for general stratigraphic position see Horseshoe Creek Section, page 137; examined by author.

		Feet.	Inches.
1. **Coal**, slaty	0′ 4″		
2. **Coal**, soft, columnar, clean	2 9	3	1

The analysis of a sample (912H) collected from No. 2 of section, as reported by Messrs. Hite and Krak, is given under **Mine No. 100** in Table 1 at the end of this Chapter. The result shows the coal carrying about 11 per cent. more volatile matter than the average of 128 samples given above, a feature in harmony with the tendency of this bed to increase in percentage of volatile and lose in fixed carbon.

Flinn Lumber Co. Coal Opening—No. 454 on Map II.

On north bank of Gauley River, in Nicholas County, 0.6 mile northwest of Horseshoe Creek; **Sewell Coal**; elevation, 800′ B.; section and sample by D. B. Reger.

	Feet.	Inches.
Sandstone, massive	15	0
Coal, soft, columnar, 2′ 8″ to	3	0
Concealed to Gauley River	35	0
Sandstone, visible	1	0

The analysis of a sample (308R) collected by Mr. Reger, as reported by Messrs. Hite and Krak, is given under **Mine No. 454** in Table 1 at the end of this Chapter.

Coal Prospect—No. 455 on Map II.

On south hillside of Gauley River, just below mouth of Horseshoe Creek; **Sewell Coal**; elevation, 870′ B.; used in Chapter VII, with Exposure No. 259 on Map II in Little Raleigh Coal, page 316; examined by author.

	Feet.	Inches.
Coal, prospect closed, reported	3	0

Coal Opening—No. 456 on Map II.

On south hillside of Gauley River, 1 mile S. 15° W. of mouth of Peters Creek; **Sewell Coal**; elevation, 925′ B.; examined by author.

	Feet.	Inches.
Coal, clean and soft, reported by Mr. J. H. Hess, about 100 feet above the river	4	1

Squire Halstead Coal Opening—No. 457 on Map II.

On south hillside of Gauley River, in Flatrock Hollow, 0.65 mile S. 5° W. of mouth of Peters Creek; **Sewell Coal**; elevation 915′ B.; section as measured by Mr. Halstead and published by Dr. White on pages 224-5 of Volume II(A); region examined by author.

					Feet.	Inches.
1.	Sandstone, **Nuttall**, great cliff					
2.	**Coal, Hughes Ferry**, 10″ to				1	8
3.	Sandstone and shale with thin **coals** (2-3)				125	0
4.	Sandstone, heavy				15	0
5.	**Coal**, soft	1′	2″			
6.	**Coal**, hard	0	2			
7.	**Coal**, soft	2	2	**Sewell**	3	6
8.	Shales and soft sandstone				25	0
9.	Sandstone, massive (**Raleigh**) cliffs to Gauley River				55	0

For the general stratigraphic position of the coal at the above opening see Mouth of Horseshoe Creek Section, page 137.

"Mr. Halstead sent a sample of the coal (taken from only 15 feet under cover) for analysis, which yielded the following results in the Survey laboratory, as reported by Messrs. Hite and Patton:

Proximate Analysis.	Per cent.	**Ultimate Analysis.**	Per cent.
Moisture	0.84	Carbon	82.17
Volatile Matter	29.90	Hydrogen	4.89
Fixed Carbon	66.22	Oxygen	8.06
Ash	3.04	Nitrogen	1.24
		Sulphur	0.60
Total	100.00	Ash	3.04
Sulphur	0.60		
Phosphorus	0.002	Total	100.00
Calorimeter B.T.U., 14,753		Calculated B.T.U., 14,382	

"These analyses show a coal of most excellent quality, and except for its higher 'volatile matter' is typical of the Sewell Coal along New River. It would yield a most excellent coke."

K. & M. R. R. Coal Prospect—No. 458 on Map II.

In Nicholas County, north bank of Gauley River, 2¾ miles northwest of Carnifex Ferry; **Sewell Coal**; elevation, 1075′ B.; used in Panther Mountain Section; section by D. B. Reger.

			Feet.	Inches.
1.	Shale, sandy			
2.	**Coal**, soft	3′ 0″		
3.	Slate, black, bony	0 6	3	6
4.	Shale, gray			

The analysis of a sample (313R) collected by Mr. Reger from No. 2 of section, as reported by Messrs. Hite and Krak, is given under **Mine No. 458** in Table 1 at the end of this Chapter.

Coal Prospect—No. 101 on Map II.

On south bank of Gauley River, 0.5 mile northwest of Carnifex Ferry; **Sewell Coal**; elevation, 1155′ B.; for general stratigraphic position, see Carnifex Ferry Section.

		Feet.	Inches.
1.	Sandstone, grayish-white, pebbly, making cliff, visible, **Lower Guyandot**	20	0
2.	Shale, sandy, hard	1	3
3.	**Coal**, medium-hard, columnar	1	10
4.	Shale, sandy, visible	1	0
5.	Concealed, to Gauley River	10	0

The analysis of a sample (914H) collected by the author from No. 3 of section, as reported by Messrs. Hite and Krak, is given under **Mine No. 101** in Table 1 at the end of this Chapter.

Kanawha District.

In Kanawha District, as shown on Map II, the Sewell Coal lies entirely below drainage, the only information concerning it here being that obtained from the logs of test wells Nos. 12 and 23 on Map II for oil and gas and diamond drill borings Nos. 10, 13, 13A, 14, and 15 on Map II, page references to which are given in the Index. No. 15 is published in connection with the Kingston Section, page 168. These well and boring records show the bed either absent or thinned below minable dimensions and constitute the authority for indicating Kanawha District barren of minable Sewell Coal on Figure 20.

Mountain Cove District.

In Mountain Cove District, as shown on Figure 20, the Sewell Coal in minable development, appears to cover almost the entire area. Its thickness and stratigraphic position are exhibited in the Ansted—Hawks Nest Section, and in the log of Coal Test Boring No. 16 on Map II, pages 172 and 402, respectively. On Mill Creek and along the New River gorge, it has long been mined commercially. Its description at these mines follows.

Mill Creek Colliery Co. Mine—No. 102 on Map II.

On east hillside of Mill Creek, 0.6 mile northeast of Hawks Nest; **Sewell Coal**; elevation, 960′ B.; used in Ansted—Hawks Nest Section, page 172; examined by author in August 1916.

			Feet.	Inches.
Coal, bony, roof 0″ to			0	6
Coal, columnar, medium-hard	1′	0″		
Coal, softer, columnar	1	10	2	10
Shale, gray, floor				

"Principal office, Ansted, W. Va.; operating since 1906; this is the only mine this Company owns; output, about 150 long tons daily; men employed, 55 inside and outside; shipped east and west, run-of-mine coal to Newport News for steam, and lump west for domestic coal; lump brings now about $1.90, and other, about $1.30 to $1.35 a short ton; R. H. Massey, Assistant Superintendent, and authority for above mine data, says it will average close 3 feet at face now, and part time has sandstone roof."

The above mine was visited by G. S. Rice of the U. S. Geological Survey on July 12, 1909, who measured and sampled the bed at two points, as given on pages 924-5 of Bulletin 22 of the U. S. Bureau of Mines, as follows:

Section A (sample 8179) was cut from the face of room 6, 50 feet from left entry 1, 1,000 feet west of the mouth of the mine. The sample was wet and the coal face was dripping moisture.

Section B (sample 8178) was cut from the face in cross-cut at head of the main entry, 1,400 feet southeast of the mouth of the mine (sample damp.)

A **composite sample** was made by mixing samples 8178 and 8179 for an ultimate analysis, the results of which are shown under laboratory No. 8288. This analysis was also published by Dr. I. C. White under No. 44 in Table No. 8 on page 245 of Bulletin 2 of the W. Va. Geological Survey. The above-mentioned analyses as well as other calculations of the same are published on page 231 of Bulletin 22 of U. S. Bureau of Mines, and are given under **Mine No. 102** in Table 3 at the end of this Chapter.

"Notes.—The coal at this mine was undercut with air-punching machines and shot down with a permissible explosive. The tipple had round-bar screens with 3¼-inch spaces. The coal was picked as it was loaded on the railroad cars. The capacity of the mine was 200 tons, the actual average output being 150 tons per day, the greater part of which was sold as run-of-mine coal. The mine was a new one and had a large acreage ahead."

The coal bed was also measured and sampled at four points in this mine by H. I. Smith and G. H. Deike, of the U. S. Geological Survey, on July 12, 1912, as given on pages 348-9 of Bulletin 85 of the U. S. Bureau of Mines, as follows:

Section A (sample 14,358) was measured at the face of left entry at room 49; thickness of bed and of coal sampled, 3′ 8½″.

Section B (sample 14,359) was measured at the face of left entry 2 at the neck of room 29; thickness of bed and of coal sampled, 3′ 0″.

Section C (sample 14,360) was measured at the face of the third left air-course; thickness of bed and of coal sampled, 2′ 5½″.

Section D (sample 14,361) was measured at the face of right entry 5; thickness of bed and of coal sampled, 2′ 8″.

A **composite sample** was made by mixing samples 14,358, 14,359, 14,360, and 14,361 for an ultimate analysis, the results of which are shown under laboratory **No. 14,362.**

The above-mentioned analyses as well as other calculations of the same are published on page 112 of Bulletin 85 of the U. S. Bureau of Mines, and are given under **Mine No. 102** in Table 3 at the end of this Chapter.

"Average thickness, 3 feet. The bed is practically horizontal. Roof, heavy shale and bony coal 6 to 18 inches thick, above which is a sandstone cap rock. Floor, hard smooth bony coal. Material from the roof and floor did not become mixed with the coal when mining. Cover, at the points where the samples were taken, approximately 600 feet."

"Notes.—The Mill Creek mine was opened by drift entries and the coal mined by the room-and-pillar system. At the time of sampling the coal was undercut by compressed-air punchers and broken down with a permissible explosive, which was also used for brushing the roof. None of the coal was shipped as run-of-mine. The screening plant consisted of bar screens 4½ by 12 feet with 3-inch spaces, through which about 50 per cent. of the coal passed. The coal was clean and the lumps were large and presented a good appearance when loaded on the cars. There are two loading tracks with a capacity for 12 empty and 12 loaded cars. About two-thirds of the coal was obtained from advance work and the remainder from pillars. The daily output was 250 tons with a maximum day's run of 400 tons."

Gaymont Colliery Co. (Abandoned) Mine—No. 103 on Map II.

On northeast hillside of New River, 1.1 miles southeast of Hawks Nest; **Sewell Coal**; elevation, 1075′ L.; examined by author.

	Feet.	Inches.
Coal	2	10

The above mine was formerly owned by Cook & Sons and was known as the "Cook" Mine when measured and sampled by Messrs. A. P. Brady and R. W. Edmonds in 1902, the analysis of the sample, as reported by Prof. Hite, being published by Dr. White under No. 1 in the table of coal analyses on pages 658-659 of Volume II, and republished by him under the same number on pages 211-12 of Volume II(A) and page 247 of Bulletin 2 of the Survey. The mine was abandoned in 1911.

This analysis is given under **Mine No. 103** in Table 1 at the end of this Chapter.

Sunbeury Coal & Coke Co. (Abandoned) "Sunnyside" Mine—No. 104 on Map II.

On northeast hillside of New River, at Sunnyside; **Sewell Coal**; elevation, 1135′ B.; abandoned in 1910; correlation verified by author.

Section "A."		Feet.	Inches.
Sandstone or shale roof........................			
Coal, soft	0′ 10¼″		
Coal, bony........................	0 1		
Coal (sometimes **mother-coal** streaks)	1 11¾ ...	2	11
Floor, hard smooth underclay			

Section "B."	Feet.	Inches.
Coal, (sometimes mother-coal streaks)..........	2	8½

Section "C."

			Feet.	Inches.
Coal, soft	0′	5⅞″		
Coal, dense, hard	0	0⅜		
Coal, grayish, coarse, granular	0	5¾		
Coal, (sometimes mother-coal streaks)	1	6⅜		
Dense bone	0	0¼		
Coal, clean	0	1⅝	2	8¼

The above sections were measured and samples taken across the entire bed-section by David White, C. A. Fisher, and A. J. Hazlewood, of the U. S. Geological Survey, on July 3, 1909, as given on pages 917-918 of Bulletin 22 of the U. S. Bureau of Mines.

Section A (sample 8068) was cut from the face of main air-course.

Section B (sample 8069) was cut from last room on Abraham entry, off fourth right parting.

Section C (sample 8244) was cut from a point 4,000 feet north and 60° east of drift mouth.

A **composite sample** was made by mixing samples 8068, 8069, and 8244 for an ultimate analysis, the results of which are shown under laboratory **No. 8287.** The last-mentioned analysis was published by Dr. I. C. White under No. 19 on page 244 of Bulletin 2 of the W. Va. Geological Survey in 1911.

The results of the analyses of all the above samples were published on page 227 of Bulletin 22 of the Bureau of Mines and are given under **Mine No. 104** in Table 3 at the end of this Chapter.

Elmo Mining Co. "Elmo Mine"—No. 105 on Map II.

On northeast hillside of New River, at Elmo; **Sewell Coal;** elevation, 1175′ B.; section by Messrs. Brady and Edmonds; examined by author.

	Feet.	Inches.
Coal	3	0

The analysis of a sample of coal collected from this mine in 1902 by Messrs. Brady and Edmonds, as reported by Prof. Hite and published by Dr. White under No. 2 on pages 658-9 of Volume II and republished by him under the same number on pages 211-212 of Volume II(A) and page 247 of Bulletin 2 of the Survey, is given under **Mine No. 105** in Table 1 at the end of this Chapter. This mine was formerly owned by the New River Mining Company.

Boone Coal & Coke Co. "Michigan Mine"—No. 106 on Map II.

On northeast hillside of New River at Michigan; **Sewell Coal;** elevation, 1215' B.; section by Messrs. Brady and Edmonds; examined by author.

	Feet.	Inches.
Coal	3	6

The analysis of a sample of coal collected from this mine in 1902 by Messrs. Brady and Edmonds, as reported by Prof. Hite and published by Dr. White under No. 3 on pages 658-9 of Volume II and republished by him under the same number on pages 211-212 of Volume II(A) and page 247 of Bulletin 2 of the Survey, is given under **Mine No. 106 in Table 1** at the end of this Chapter. This mine was formerly owned by the Michigan Coal Company.

Ajax Coal Co. "Ajax Mine"—No. 107 on Map II.

On northeast hillside of New River, 0.7 mile northwest of Fayette Station; **Sewell Coal;** elevation, 1260' B.; section by Messrs. Brady and Edmonds and correlation verified by author.

	Feet.	Inches.
Coal	3	2

The analysis of a sample of coal collected from this mine in 1902 by Messrs. Brady and Edmonds, as reported by Prof. Hite and published by Dr. White under No. 4 on pages 658-9 of Volume II and republished by him under the same number on pages 211-212 of Volume II(A) and page 247 of Bulletin 2 of the Survey, is given under **Mine No. 107** in Table 1 at the end of this Chapter. This mine was formerly owned by the Newlyn Coal Company.

The bed was measured and sampled at two points on July 13, 1909, by H. M. Wolflin, and at two points on August 5, 1909, by A. J. Hazlewood, as given on pages 918-919 of Bulletin 22 of the U. S. Bureau of Mines.

Section A (sample 8216) was cut from the face of entry 8, about 2,150 feet, approximately southeast of drift mouth; thickness of bed and of coal sampled, 2' 1½".

Section B (sample 8217) was cut from cross-cut, near face of entry 1, about 2,500 feet northeast of drift mouth; thickness of bed and of coal sampled, 2′ 0″.

Section C (sample 8704) was cut from face of face entry 2, about 2,450 feet southeast of drift mouth; thickness of bed and of coal sampled, 2′ 1¾″.

Section D (sample 8705) was cut from face of room 8, off left entry 3, about 1,500 feet from drift mouth; thickness of bed and of coal sampled, 2′ 8½″.

A **composite sample** was made by mixing samples 8217, 8704, and 8705 for an ultimate analysis, the results of which are shown under laboratory **No. 9147.**

These 5 analyses taken from page 227 of Bulletin 22 of the U. S. Bureau of Mines are given under **Mine No.** 107 in Table 3 at the end of this Chapter.

"Notes.—The coal was undercut by hand in the bed and was shot down with black powder. The tipple was not equipped with screens. so the entire output was shipped as run-of-mine coal. The estimated output in 1909 was about 275 tons daily, and 360 tons was a maximum day's run. The tonnage for some time to come was to be derived principally from advance work.

"The thickness ranges as mined from about 2 feet to 2¾ feet; roof, hard blue shale, usually underlain with a few inches of bone, between which and the shale there is in places a few inches of draw slate; floor, hard shaly underclay, between which and the coal there is in places a few inches of bone; cover, for the most part, 100 feet or more."

Fayette Coal & Coke Co. "Fayette Mine"—No. 108 on Map II.

On northeast hillside of New River, ¼ mile due east of Fayette Station; **Sewell Coal**; elevation, 1325′ B.; examined by author.

	Feet.	Inches.
Coal	3	6

Nuttall District.

In Nuttall District, the thickness and stratigraphic position of the Sewell Coal are exhibited in the sections published in Chapter IV for Miller, Divide, Winona, and Nuttallburg, pages 175, 178, 178, and 179, respectively; and in the logs of Coal Test Borings Nos. 23 and 25 on Map II, pages 403 and 403, respectively. As shown on Map II, it lies below drainage over the greater portion of the District, its outcrop being confined to the valley walls of New River, Keeney and Manns Creeks and those of Meadow River above Miller and Brackens

Creek above Russellville. In that portion drained by the waters of Meadow River, the information concerning its thickness and character is very meager, owing to the fact that the Survey was unable to obtain the logs of Coal Test Borings Nos. 18-22 and 24-5 on Map II, all of which are listed in the table published on page 388A. In this region the bed is somewhat irregular at its crop exposures along the stream last mentioned, but is believed that over the District as a whole it will average 3 feet in thickness, the dimension assumed in computing the table of estimates of available tonnage on a subsequent page of this Chapter, judging from the data obtained at the many commercial mines on it in the southwest half. Its description at the latter, prospect openings and other exposures follows.

Nuttallburg Smokeless Fuel Co. "Nuttallburg Mine"—No. 109 on Map II.

On northeast hillside of New River, at Nuttallburg; **Sewell Coal;** elevation, 1560' L.; for general stratigraphic position, see Nuttallburg Section, page 179; section at entrance by author.

				Feet.	Inches.
1.	Sandstone, platy, shaly top			25	0
2.	Bony cannel	0'	6		
3.	Slate, black, cannelly	1	11		
4.	Bony cannel	0	7		
5.	**Coal**, soft, columnar (shale floor)	2	9	5	9

"Mr. M. M. Tyree, Superintendent, says the cannel portion disappears and that No. 5 of section runs from 3' 6" to 4' 6" and will average 4 feet; that the bed seems to increase in thickness to the northeast. This mine is about 40 years old and was the first to be opened in the Sewell Coal. It was formerly owned by the Nuttallburg Coal & Coke Company. Have 2000 acres of coal left and haul 2 miles from the northeast. On page 658 of Volume II the coal was reported to have a thickness of 3' 9" by Messrs. Brady and Edmonds."

The analysis of a sample of coal collected from this mine in 1902 by Messrs. Brady and Edmonds, as reported by Prof. Hite and published by Dr. White under No. 5 on pages 658-9 of Volume II and republished by him under the same number on pages 211-212 of Volume II(A) and page 247 of Bulletin 2 of the Survey, is given under **Mine No. 109** in Table 1 at the end of this Chapter.

Aileen Coal Co. "Keeneys Creek Mine"—No. 110 on Map II.

On east hillside of New River, ¼ mile northeast of mouth of Keeneys Creek; **Sewell Coal**; elevation, 1670′ L.; section by Messrs. Brady and Edmonds.

	Feet.	Inches.
Coal	3	2

Section by author—main entry:

	Feet.	Inches.
Shale, sandy, buff	20	0
Slate, black	0	6
Coal, soft	3	6
Slate		

This mine has been in operation about 30 years and was formerly owned by the Nuttallburg Coal and Coke Company, the Keeneys Creek Colliery Company, and the Holiday Coal & Coke Company.

The analysis of a sample of coal collected from this mine in 1902 by Messrs. Brady and Edmonds, as reported by Prof. Hite and published by Dr. White under No. 8 on pages 658-9 of Volume II and republished by him under the same number on pages 211-212 of Volume II(A) and page 248 of Bulletin 2 of the Survey, is given under **Mine No. 110** in Table 1 at the end of this Chapter.

The bed was measured and sampled at two points by A. C. Ramsay, of the U. S. Geological Survey, July 9, 1909, as given on page 917 of Bulletin 22 of the U. S. Bureau of Mines.

Section A (**sample 8140**) was cut from entry 3, off Virginia entry, 1,700 feet from drift mouth; thickness of bed, 3′ 4⅛″; thickness of coal sampled, 3′ 2⅜″.

Section B (**sample 8141**) was cut from straight heading, 2,600 feet from drift mouth.

A **composite sample** was made by mixing samples 8140 and 8141 for an ultimate analysis, the results of which are shown under laboratory **No. 8190**. This analysis, as also an air-dried calculation of same, was published by Dr. White under No. 39 on page 245 of Bulletin 2 of the Survey.

The analyses of samples Nos. 8140, 8141, and 8190, as also the air-dried sample of the latter, as taken from page 227 of Bulletin 22 of the U. S. Bureau of Mines, are given under **Mine No. 110** in Table 3 at the end of this Chapter.

"Notes.—The coal in this mine was undercut by hand in the bottom of the bed. Explosives used for shooting down the coal were of the permissible type and also black blasting powder. The coal was shipped in run-of-mine form because the plant was not equipped with screens. The daily output in 1909 averaged 125 tons and 225 tons was a maximum day's run. The future output was to be increased to 250 tons. The mine had 200 acres of unmined coal. The thickness averages 3½ feet. The roof is a hard gray shale, between which and the coal is a 2-inch layer of draw slate. The floor is a soft underclay with a smooth surface. No pieces of roof or floor got mixed with coal in loading. There is a cap rock of sandstone 20 feet above the coal."

Sewell Colliery Co. "Caperton Mine"—No. 111 on Map II.

On east hillside of New River, at Caperton; **Sewell Coal**; elevation, 1705′ B.; section by W. Va. Department of Mines; correlation verified by author.

	Feet.	Inches.
Coal	4	0

This mine was formerly owned by the Chapman Coal, Coke and Iron Company.

The bed was measured and sampled at five points in the mine by G. H. Deike on July 11, 1912, as given on pages 345-6 of Bulletin 85 of the U. S. Bureau of Mines.

Section A (sample 14344) was measured at the face of a room turned off at the face of the drainage entry (Sugar Camp No. 3 workings); thickness of bed and of coal sampled, 4′ 0″.

Section B (sample 14345) was measured at the face of the last break-through in the third right air-course (Sugar Camp No. 1 workings); thickness of bed 2′ 9″; thickness of coal sampled, 2′ 5″.

Section C (sample 14346) was measured at the face of the thirteenth right entry, 5,000 feet northeast of mine mouth. (Old Hill workings). Thickness of bed, 4′ 2½″; thickness of coal sampled, 4′ 0″.

Section D (sample 14348) was measured on pillar at the last room off cross entry 11. (Old Hill workings). Thickness of bed and of coal sampled, 3′ 8½″.

Section E (sample 14349) was measured on the pillar of right entry 2. (Sugar Camp No. 2 workings). Thickness of bed, 4′ 1″; thickness of coal sampled, 3′ 11″.

Two **composite samples** were made: (1) by mixing samples 14344, 14345, and 14346 for an ultimate analysis, the results of which are given under laboratory **No. 14347**; (2) by mixing samples 14348 and 14349 for an ultimate analysis, the results of which are given under laboratory **No. 14350**.

These 7 analyses, as published on page 111 of Bulletin 85 of the U. S. Bureau of Mines, are given under **Mine No. 111** in Table 3 at the end of this Chapter.

"Notes.—The Sewell mine is opened by a number of drift entries, and the coal is mined by the room-and-pillar system. At the time of sampling the coal was undercut both by hand and by electric chain machines and broken down with FFF black powder and permissible explosives. All of the coal was shipped as run-of-mine. There was a screening plant with 12-foot bar screens spaced 1¼ inches apart. The coal was clean and needed no picking when loading. There were 2 loading tracks with capacity for 14 empty and 20 loaded cars. About 50 per cent. of the coal was obtained from advance workings. There was approximately 300 acres of unmined coal tributary to the various entries. The output of the mine was 300 tons a day, with a maximum day's run of 550 tons. Average thickness, 3 feet 8 inches; dip, 1½ per cent. northeast. The cleat is well marked, and there are no rolls or faults in this mine. The roof consists of a smooth draw slate 3 to 9 inches thick, above which is a sandstone cap. Floor, hard, smooth shale. Pieces of the roof occasionally mixed with the coal when loading but none of the floor material was taken up with the coal. Cover at points of sampling, 250 to 400 feet."

The analysis of a sample of coke collected at this mine by Messrs. Brady and Edmonds, as published under No. 1 (Victoria Coal & Coke Co.) on pages 663-4 of Volume II by Dr. White and republished by him under the same number on page 214 of Volume II(A) and page 249 of Bulletin 2 of the Survey, is given under **Mine No. 111** in Table 2 at the end of this Chapter.

Sewell Colliery Co. "Extension Mine"—No. 112 on Map II.

On west hillside of branch of Manns Creek, 1.1 miles S. 50° E. of Caperton; **Sewell Coal**; elevation, 1855′ B.; for general stratigraphic position see Manns Creek Section; section measured 100 feet in from drift mouth by author.

			Feet.	Inches.
Shale, roof				
Coal, soft, columnar	0′	11″		
Coal, gray, medium-hard	0	4		
Coal, soft, columnar, (slate floor)	3	3	4	6

Sewell Colliery Co. "Extension Mine"—No. 113 on Map II.

On west hillside of branch of Manns Creek, 0.4 mile northeast of Mine No. 112; **Sewell Coal**; elevation, 1920′ B.; section measured at mine entry by author.

	Feet.	Inches.
Coal, soft, columnar, (shale roof and slate floor)	4	0

Coal Exposure—No. 459 on Map II.

On southeast hillside of Manns Creek, 0.35 mile south of Flannigan School; **Sewell Coal**; elevation, 2215' B.; examined by author.

	Feet.	Inches.
Coal, in trail, 3' 0" to	4	0

Coal Opening—No. 460 on Map II.

On north hillside of Keeney Creek, ¾ mile west of Boone; **Sewell Coal**; elevation, 1670' B.; examined by author.

	Feet.	Inches.
Shale, buff, visible	4	0
Coal, soft, columnar, (slate floor)	3	6

Ballinger Coal Co. No. 2 Mine (Abandoned)—No. 114 on Map II.

On southeast hillside of Keeney Creek, 1 mile southwest of Winona, in **Sewell Coal**, at an elevation of 1955' B., was mined out and abandoned 7 years ago.

Keeneys Creek Colliery Co. "Lower Boone" Mine—No. 115 on Map II.

On east hillside of Contrary Creek, 0.8 mile due west of Winona; **Sewell Coal**; elevation, 1790' B.; examined by author.

				Feet.	Inches.
1.	Slate, sandy				
2.	Bony cannel slate, 42" to			0	0
3.	**Coal**, soft, columnar	1'	0"		
4.	**Coal**, gray, hard	0	1		
5.	**Coal**, soft	0	2		
6.	**Coal**, gray, hard	0	2		
7.	**Coal**, soft	1	11		
8.	**Coal**, slaty (slate floor)	0	6	3	10

"This is the normal section and was measured on the rib of the main motor haulway about 300 feet in. No. 8 is left down, generally a bone top and when it runs out there is about 2" of draw slate. Mine has been in operation since 1892. Principal office, Winona, W. Va.; butts, S. 75° E.; faces, S. 15° W.; authority for mine data, Samuel [illegible], track layer. Output, 60,000 tons annually, or 275 tons daily; all shipped for steam purposes, 75 per cent. east and 25 per cent. west; men employed, 70 inside and 10 outside; authority, J. Wade Bell, Superintendent."

This mine was formerly owned by the Boone Coal & Coke Co. It was measured and sampled in 1902 by Messrs. Brady and Edmonds, the thickness being reported 3' 7" and analysis of same as made by Prof. Hite was published by Dr. White on pages 658-9 of Volume II under No. 7. This analysis was republished by him under the same number of pages 211-212 of Volume II(A) and page 248 of Bulletin 2 of the Survey. It is given under **Mine No. 115** in Table 1 at the end of this Chapter.

The bed was also measured and sampled at three points by A. C. Ramsay, of the U. S. Geological Survey, on July 8, 1909, as published on pages 909-910 of Bulletin 22 of the U. S. Bureau of Mines.

Section A (sample 8137) was cut from the face of right entry 4, 2,000 feet from drift mouth. Thickness of bed and of coal sampled, 4′ 9¼″.

Section B (sample 8138) was cut from the face of the old main entry, 1,800 feet from drift mouth. Thickness of bed and of coal sampled, 4′ 2″.

Section C (sample 8139) was cut from right entry 4, 2,000 feet from drift mouth.

A **composite sample** was made by mixing samples 8137, 8138, and 8139 for an ultimate analysis, the results of which are shown under laboratory **No. 8193.**

These 4 analyses, as taken from page 223 of Bulletin 22 of the U. S. Bureau of Mines, are given under **Mine No. 115** in Table 3 at the end of this Chapter.

"Notes.—The coal from this mine was undercut in the bottom part of bed with chain machines and was shot down with black powder. The tipple was not equipped with screens, so that the entire output was shipped in run-of-mine form. There was one loading track. The coal was picked on the car. The daily output averaged 400 tons, and 500 tons was the maximum day's run. The future output was to be derived from both advance work and pillars. Thickness, fairly uniform, ranging as mined from 3 feet 2 inches to 4 feet 10 inches; there is a 'fault' on one side of the mine; roof, strong blue shale which does not fall with the coal; floor, fairly hard underclay with smooth surface and underlain with hard shale; cover, for the most part, 200 to 250 feet."

Rothwell Coal Co. "Quarrier" Mine (Abandoned)—No. 115A on Map II.

On west hillside of Keeney Creek, 0.4 mile northeast of Winona; **Sewell Coal**; elevation, 2135′ B.; section by Messrs. Brady and Edmonds; correlation verified by author.

	Feet.	Inches.
Coal	3	7

This mine was opened in 1897 and abandoned June 7, 1902. Messrs. Brady and Edmonds sampled the coal from it for analysis by Prof. Hite, the results being published by Dr. White under No. 14 on pages 658-9 of Volume II and republished by him under the same number on pages 211-212 of Volume II(A) and page 248 of Bulletin 2 of the Survey. This analysis is given under **Mine No. 115A** in Table 1 at the end of this Chapter.

Rothwell Coal Co. "Rosedale Mine"—No. 116 on Map II.

On west hillside of Keeney Creek, 0.6 mile north of Winona; **Sewell Coal**; elevation, 2100′ B.; section 150 to 200 feet in from drift mouth by author.

	Feet.	Inches.
Sandstone		
Shale, sandy	1	6
Coal, soft, (shale, sandy, floor)	4	5

"Started operation in March, 1913; men employed, 5 inside and 1 outside; just developing; 660 acres in lease; all its output shipped for steam purposes; Herbert Rothwell, Superintendent, and authority for data; according to Mr. Rothwell, the coal varies from 2′ 10″ to 5′ 0′."

Blume Coal & Coke Co. "Blume Mine"—No. 117 on Map II.

On north hillside of Keeney Creek, 1.2 miles N. 30° E. of Winona; **Sewell Coal**; elevation, 2190′ B.; section by Messrs. Brady and Edmonds; correlation verified by author.

	Feet.	Inches.
Coal	3	7

The analysis of a sample of coal collected by Messrs. Brady and Edmonds from this mine, as reported by Prof. Hite and published by Dr. White under No. 20 on pages 658-9 of Volume II and republished by him under the same number on pages 211-212 of Volume II(A) and page 248 of Bulletin 2, is given under **Mine No. 117** in Table 1 at the end of this Chapter.

The coal bed was also measured and sampled at three points by R. Y. Williams, of the U. S. Geological Survey, on July 7, 1909, and at one point by A. J. Hazlewood, of the same Survey, on July 26, 1909, as given on page 929 of Bulletin 22 of the U. S. Bureau of Mines.

Section A (sample 8149) was cut from the face of right entry 10, 4,000 feet from drift mouth; thickness of bed and of coal sampled, 3′ 3½″.

Section B (sample 8150) was cut from the face of main straight entry, 4,500 feet from entry; thickness of bed and of coal sampled 2′ 10⅛″.

Section C (sample 8156) was cut from the face of right entry 1, off left entry 4, 1,500 feet from drift mouth; thickness of bed and of coal sampled, 3′ 1″.

Section D (sample 8609) was cut from the face of right entry 1, off left entry 4, 1,500 feet from drift mouth; thickness of bed and of coal sampled, 3′ 1½″.

A **composite sample** was made by mixing samples 8149 and 8150 for an ultimate analysis, the results of which are shown under laboratory **No. 8194.**

These 5 analyses, as taken from page 233 of Bulletin 22 of the U. S. Bureau of Mines, are given under **Mine No. 117** in Table 3 at the end of this Chapter.

"Notes.—The coal was undercut by chain machines in the bottom part of bed, and was shot down with permissible explosives and black powder. There were no screens; therefore the entire output was shipped as run-of-mine coal. This is a coking coal, but there were no ovens at this plant. The coal was picked on car. The daily output in July, 1909, averaged 500 tons, and 650 tons was a maximum day's run. The future output for some time to come was to be derived almost entirely from advance work. Thickness, fairly uniform, ranging as mined from 3 to 4 feet; roof, strong, gray, fine-grained shale, 18 feet thick, with a cap rock above; floor, hard clay."

Lookout Coal & Coke Co. "Lookout Mine"—No. 118 on Map II.

On northeast bank of Keeney Creek, 0.35 mile south of Divide; **Sewell Coal**; elevation, 2210′ B.; examined by author.

	Feet.	Inches.
Sandstone roof		
Coal, soft, columnar, 3′ 2″ to 3′ 6″		
Coal, slaty, (shale, gray, floor) 0 2	3	8

"Do not have much draw slate, only a few patches; mostly sandstone roof. J. E. Tincher, Foreman, says it will average 3′ 3″ clean coal. Coal mostly shipped east for steam; men employed 46 inside, and 6 outside."

The bed was also measured and sampled at two points by A. C. Ramsay, of the U. S. Geological Survey, on July 6, 1909, as given on page 930 of Bulletin 22 of the U. S. Bureau of Mines.

Section A (sample 8135) was collected from the face of left entry 1, 600 feet from drift mouth; thickness of bed and of coal sampled, 2' 10".

Section B (sample 8136) was collected from the face of left entry 2, off the straight entry, 1,300 feet from drift mouth; thickness of bed and of coal sampled, 2' 8¾".

A composite sample was made by mixing samples 8135 and 8136 for an ultimate analysis, the results of which are shown under laboratory No. 8189. The latter analysis was published by Dr. White under No. 38 on page 245 of Bulletin 2 of the W. Va. Geological Survey in 1911 along with an air-dried calculation of the same.

These analyses, as taken from page 233 of Bulletin 22 of the U. S. Bureau of Mines and the air-dried from Bulletin 2 of the W. Va. Geological Survey, are given under Mine No. 118 in Table 3 at the end of this Chapter.

"Notes.—The coal was undercut in bottom part of bed with a chain machine, and was shot down with a permissible explosive and black powder. The tipple was not equipped with screens, so that the entire output was shipped as run-of-mine coal. The coal was picked on car. This is a coking coal, but there were no ovens at this plant. The average daily output was estimated as 130 tons, and 175 tons was the maximum day's run. The future output for some years to come was to be derived from advance work only. Thickness, fairly uniform, ranging as mined from 3 to 4 feet; roof strong, coarse-grained, gray shale, with a cap rock 5 to 18 feet above; the roof seldom falls with the coal; floor, hard clay with smooth surface, underlain with slate; cover for the most part, 100 to 200 feet thick."

Rothwell Coal Co. "Dubree Mine"—No. 119 on Map II.

On head of branch of Keeney Creek, 0.9 mile N. 60° E. of Winona; Sewell Coal; elevation, 2245' B.; section taken 300' in by author.

			Feet.	Inches.
Sandstone				
Coal, 0" to	0'	3"		
Sandstone, 0" to	0	5		
Coal, soft	3	8		
Coal, and slate mixed, 9" to	1	3	5	7

The coal was also reported 3' 9" thick by Messrs. Brady and Edmonds when they sampled the same for analysis in 1902, as published by Dr. White on page 658 of Volume II. The analysis of this sample as reported by Prof. Hite, and published by Dr. White under No. 15 on pages 658-9 of Volume II and republished by him under the same number on pages 211-212 of Volume II(A) and page 248 of Bulletin 2, is given under **Mine No.** 119 in Table 1 at the end of this Chapter.

The bed was also measured and sampled at two points by R. Y. Williams, of the U. S. Geological Survey, on July 6, 1909, as given on page 959 of Bulletin 22 of the U. S. Bureau of Mines.

Section A (sample 8147) was cut from the face of room 7 on right entry 7; thickness of bed and of coal sampled, 3′ 2⅞″.

Section B (sample 8148) was cut from the face of left entry 7; thickness of bed and of coal sampled, 3′ 4⅞″.

A **composite sample** was made by mixing samples 8147 and 8148 for an ultimate analysis, the results of which are shown under laboratory **No. 8191.**

These 3 analyses, as taken from page 245 of Bulletin 22 of the U. S. Bureau of Mines, are given under **Mine No.** 119 in Table 3 at the end of this Chapter.

"Notes.—The coal at this mine was undercut with chain machines in bottom part of bed, and was shot down with black powder. The tipple was not equipped with screens, and therefore the entire output was shipped as run-of-mine coal. This is a coking coal, but there were no ovens at this plant. The coal was picked on car by one trimmer. The estimated daily output was about 300 tons, which was about a maximum day's run. The output for some time was to be derived almost entirely from advance work. At this mine the bed ranges in thickness as mined from 3 feet to 3 feet 6 inches and dips gently northeast; roof, hard, brittle sandstone which does not fall with the coal; floor, hard clay with smooth surface."

Keeneys Creek Colliery Co. "Smokeless Mine"—No. 120 on Map II.

On southeast hillside of Keeney Creek, 0.4 mile east of Winona; **Sewell Coal**; elevation, 2265′ B.; section by Messrs. Brady and Edmonds; data by author.

	Feet.	Inches.
Coal	3	9

"This mine was formerly owned by the Smokeless Coal and Coke Company; operated 24 years; principal office, Winona, W. Va.; output of Smokeless Mine, 70,000 tons for 1915, or about 350 tons daily, 9 hours; lease coal of Nuttall Heirs; ship now (September, 1916) about 75 per cent. west for domestic fuel; runs 60 per cent. lump and egg on account of sandstone roof, under which it is harder; other 25 per cent. is shipped east for domestic purposes. Practically all shipped for domestic purposes on account of being practically the hardest coal in field. Men employed, 90 inside, 20 outside; authority for mine data, J. Wade Bell, Superintendent."

The analysis of a sample collected at this mine in 1902 by

Messrs. Brady and Edmonds, as reported by Prof. Hite and published by Dr. White under No. 17 on pages 658-9 of Volume II and republished by him under the same number on pages 211-212 of Volume II(A) and page 248 of Bulletin 2 of the Survey, is given under Mine No. 120 in Table 1 at the end of this Chapter.

The coal bed was also measured and sampled at two places in this mine by K. M. Way, of the U. S. Geological Survey, on October 12, 1907, and at three points by A. C. Ramsay, of the same Survey, on July 6, 1909, as given on pages 958-9 of Bulletin 22 of the U. S. Bureau of Mines.

Section A (sample 5467) was measured in left entry 1 for motor hauls, 1,800 feet southeast of the mine opening; thickness of bed and of coal sampled, 3′ 10¾″.

Section B (sample 5468) was measured in right heading 1, off the main entry, 2,500 feet south of the mine opening; thickness of bed, 3′ 9¾″; thickness of coal sampled, 3′ 8½″.

Section A (sample 8132) was cut from the face of the Adams entry, 2,200 feet from drift mouth; thickness of bed and of coal sampled 3′ 8″.

Section B (sample 8133) was cut from the face of left entry 3, 2,000 feet from drift mouth; thickness of bed and of coal sampled, 4′ 4½″.

Section C (sample 8134) was cut from a pillar between left cross entries 14 and 15 off old Hill main entry, 1,500 feet from drift mouth.

A composite sample was made by mixing face and pillar samples 8132, 8133, and 8134 for an ultimate analysis, the results of which are shown under laboratory No. 8186. This latter analysis along with an air-dried calculation of the same was published by Dr. White under No. 27 on page 245 of Bulletin 2 of the W. Va. Geological Survey.

These analyses, as taken from page 245 of Bulletin 22 of the U. S. Bureau of Mines, are given under Mine No. 120 in Table 3 at the end of this Chapter. The analyses of samples 5467, 5468, 5709, and 5711 had been previously published by the U. S. Geological Survey on pages 16-17 of Bulletin 362.

Notes.—The coal at this mine was undercut with chain machines in bottom part of bed, and was shot down with a short-flame explosive or black powder. The tipple had no screens, and therefore the entire output was shipped as run-of-mine coal. This is a coking coal, but there were no ovens at this plant. The daily output at time of sampling averaged about 450 tons, and 650 tons was a maximum day's run. The future output was to be derived from both advance work and pillars. The bed in this mine lies nearly flat, and has an average thickness of 3 feet 10 inches. The roof is shale or strong blue shale which does not fall with coal; floor, shale or hard clay with smooth surface The coal is clean, with no streaks of shale or "sulphur." There are fairly regular benches separated by thin streaks of mother coal. Cover, for the most part, 150 to 300 feet thick."

Samples Nos. 5709 and 5711 were car samples shipped to the U. S. Fuel-Testing Plant at Norfolk, Virginia. The cars were loaded under the supervision of Inspector K. M. Way, and the coal was used in making steaming and briquetting tests. Twenty-four days elapsed before the shipment of the coal and its use at the testing plant, during which period the coal was exposed to the weather.

The following results of **briquetting tests** of the two cars shipped to Norfolk (Jamestown No. 9) are taken from pages 25-26 of Bulletin 385 of the U. S. Geological Survey:

"This coal was briquetted with three different kinds of binders. The briquets from test No. 274 made with water-gas pitch (Lab. No. 5939) were the strongest of the three. All three tests made excellent briquets, which gave good metallic rings when knocked together, had smooth, hard surfaces, were broken with difficulty, and had firm and glossy fractured surfaces.

Briquet Tests.

Test No.	272	273	274
Size of coal, as used:			
Over 1-4 inch........per cent.	0.0	....	....
1-10 to 1-4 inch........per cent.	7.9	....	....
1-20 to 1-10 inch........per cent.	22.9	....	....
1-40 to 1-20 inch........per cent.	30.5	....	....
Through 1-40 inch........per cent.	37.1	....	....
Details of manufacture:			
Machine used........	Am.	Am.	Am.
Briquetting temperature........°F.	195	198	198
Binder:			
Kind	W. G. P.	W. G. P.	W. G. P.
Laboratory No. (See p. 8 of Bulletin 385)	5941	5563	5939
Amount ....per cent.	7	7	7
Weight of:			
Fuel briquetted........pounds	46,000	2,000	2,000
Briquets, average........pounds	0.625	0.602	0.610
Heat value per pound:			
Coal as received........B. T. U.	14,238	14,238	14,238
Briquets ....B. T. U.	14,699	....	....
Binder ....B. T. U.	16,978	16,718	16,781
Moisture in briquet mixture........per cent.	5.65	....	....
Drop test (1-inch screen):			
Held ....per cent.	57.5	71.0	73.0
Passed ....per cent.	42.5	29.0	27.0
Tumbler test (1-inch screen):			
Held ....per cent.	64.0	77.0	83.5
Passed ....per cent.	36.0	23.0	16.5
Fines through 10-mesh sieve.per cent.	95.1	96.7	96.6
Weathering test:			
Time exposed........days	125	52	125
Condition	A	A	A
Water absorption:			
Time immersed........days	12	21	13
Water absorbed........per cent.	16.66	13.02	13.14
Average for first four days..per cent.	3.49	2.75	2.79
Specific gravity (apparent)........	1.072	1.118	1.117

Chemical Analyses of Briquets, Test 272, Lab. No. 5745.

Proximate.		Ultimate.	
Moisture	2.64	Hydrogen	5.16
Volatile Matter	25.29	Carbon	82.34
Fixed Carbon	67.61	Nitrogen	1.11
Ash	4.46	Oxygen	6.28
Sulphur	0.65		

Extraction Analyses.

	Pitches.		Fuel. J-9.	Briquets Test 272.
Laboratory No.	5941	5939	5709	5745
Air-drying loss p.c.	0	0	3.00	2.10
Extracted by CS_2:				
Air dried p.c.	98.44	98.13	.706	4.78
As received p.c.	98.44	98.13	.685	4.77
Pitch in briquet as received, p.c.	.....	.....	.....	4.18

Keeneys Creek Colliery Co. "Smokeless Mine"—No. 121 on Map II, on head of branch of Keeney Creek, 1.3 miles S. 85° E. of Winona, at an elevation of 2305′ B., is in Sewell Coal and is present main entry of "Smokeless Mine". It was formerly owned by the Smokeless Coal and Coke Company. See description of Mine No. 120.

Ballinger Coal Co. No. 1 Mine—No. 122 on Map II.

On east hillside of branch of Keeney Creek, 0.9 mile S. 50° E. of Winona; **Sewell Coal**; elevation, 2370′ B.; section at entry by author.

			Feet.	Inches.
Coal, soft, columnar, (slate roof)	1′	0″		
Coal, gray, medium-hard	0	4		
Coal, soft, columnar, (shale floor)	2	4	3	8

Messrs. Brady and Edmonds reported a thickness of 3′ 9″ at this mine as published by Dr. White on page 658 of Volume II. The analysis of a sample collected by them as reported by Prof. Hite and published by Dr. White under No. 16 on pages 658-9 of Volume II and republished by him under the same number on pages 211-212 of Volume II(A) and page 248 of Bulletin 2, is given under **Mine No. 122** in Table 1 at the end of this Chapter.

The bed was also measured and sampled at three points by R. Y. Williams, of the U. S. Geological Survey, on July 8, 1909, and at one point by A. J. Hazlewood, of the same Sur vey, on July 26, 1909, as given on page 908 of Bulletin 22 of the U. S. Bureau of Mines.

Section A (sample 8146) was cut from the face of entry 6, Klondike side; thickness of bed and of coal sampled, 3′ 0¼″.

Section B (sample 8154) was cut from the face of drift 2, Egypt side, 600 feet from drift mouth; thickness of bed and of coal sampled, 3′ 2¼″.

Section C (sample 8155) was cut from the face of left entry 6, in Egypt No. 1; thickness of bed and of coal sampled, 4′ 2¾″.

Section D (sample 8608) was cut from the face of left entry 6, 2,000 feet from drift mouth; thickness of bed and of coal sampled, 3′ 8¾″.

A **composite sample** was made by mixing samples 8154 and 8146 for an ultimate analysis, the results of which are shown under laboratory **No. 8195.**

These 5 analyses, as taken from page 223 of Bulletin 22 above mentioned, are given under **Mine No. 122** in Table 3 at the end of this Chapter.

"Notes.—The coal at these mines was cut by hand in the upper part of the bed then shot down. There were no coke ovens at this plant, the coal being shipped as run-of-mine. The daily output in July, 1909, averaged 450 tons, and 500 tons was the maximum day's run. The future output was to be derived from both advance work and pillars. Thickness, fairly uniform, ranging from 3′ 2″ to 4′ 0″; roof, rather soft light-gray slate, which does not fall with the coal; floor, soft underclay with smooth surface."

Ballinger Coal Co. Drift Mine—No. 123 on Map II.

On head of branch of Keeney Creek, 1.4 miles S. 20° E. of Winona; **Sewell Coal**; elevation, 2445′ B.; examined by author.

	Feet.	Inches.
Shale, gray, roof		
Coal, soft (slate floor)	3	10

Ballinger Coal Co. "Flanagan Mine"—No. 124 on Map II.

On head of branch of Manns Creek, 1.6 miles S. 5° E. of Winona; **Sewell Coal**; elevation, 2400′ B.; examined by author.

			Feet.	Inches.
Coal soft (shale roof)	1′	0″		
Coal, gray, medium-hard	0	3		
Coal, soft (slate floor)	2	5	3	8

Mr. N. E. Hoke, Foreman, says the bed averages 3′ 8″ and in some places is 5 feet thick.

Coal Opening—No. 461 on Map II, on head of Road Fork of Brackens Creek, 1.8 miles S. 50° E. of Winona, at an elevation of 2375′ B., is in the Sewell Coal as determined by author, but the thickness was not obtained.

Keeneys Creek Colliery Co. Mine—No. 462 on Map II.

On north side of Road Fork of Brackens Creek, 2.1 miles S. 65° E. of Winona; **Sewell Coal**; elevation, 2255′ B.; examined by author.

			Feet.	Inches.
1. Sandstone, visible			5	0
2. Slate, black, cannelly			4	6
3. **Coal**, slightly bony	0′	6″		
4. **Coal**, soft, columnar (slate floor)	3	4	3	10

"No. 3 of section is not loaded. Butts, N. 50° W. Faces, S. 40° W."

Another section by the author farther in shows 4′ 4″ of clean, soft coal, with slate roof.

Brackens Creek Coal & Land Co. Coal Prospect—No. 463 on Map II.

On west hillside of Brackens Creek, 2½ miles southwest of Russellville; **Sewell Coal**; elevation, 2005′ B.; examined by author.

			Feet.	Inches.
Shale, buff, sandy, visible			5	0
Coal, medium-soft, 1′ 6″ to	1′	8″		
Shale, sandy, hard, dark, 6″ to	0	8		
Coal, soft, 1′ 8″ to (slate floor)	1	10	4	2

James Walker (Nuttall Estate) Coal Opening—No. 125 on Map II.

On west hillside of Brackens Creek, 1.9 miles southwest of Russellville; **Sewell Coal**; elevation, 2030′ B.; examined and sampled by author.

			Feet.	Inches.
1. Shale, buff, visible			4	0
2. Slate, black, cannel			0	8
3. **Coal**, medium-soft	1′	6″		
4. **Coal**, bony, hard	0	1½		
5. **Coal**, medium-soft	1	5½		
6. **Coal**, bony, hard	0	3	3	4
7. Slate, black, visible, at entry			1	0
8. Concealed to bed of branch			10	0

The analysis of a sample (918H) collected from Nos. 3 and 4 of section, as reported by Messrs. Hite and Krak, is given under **Mine No.** 125 in Table 1 at the end of this Chapter.

Coal Prospect—No. 464 on Map II.

On a north branch of Brackens Creek, 1 mile southwest of Russellville; **Sewell Coal**; elevation, 2025′ B.; examined by author.

	Feet.	Inches.
Coal, opening closed, reported by A. M. Moore...	1	6

Coal Opening—No. 465 on Map II.

On west hillside of Meadow River, 0.2 mile northwest of Russellville; **Sewell Coal**; elevation, 2045′ B.; for stratigraphic position see Russellville Section.

	Feet.	Inches.
Shale, flaggy, sandy, gray, visible...............	5	0
Coal, soft....................................	1	1
Fire clay shale...............................	1	3

Geo. W. Boley Coal Opening—No. 466 on **Map II**, at road fork, 0.6 mile N. 25° W. of Russellville, in the **Sewell Coal**, at an elevation of 1980′ B., was closed and thickness not learned.

Coal Prospect—No. 467 on Map II.

On west hillside of Meadow River, at Nallen; **Sewell Coal**; elevation, 1930′ B.; examined by author.

			Feet.	Inches.
Shale, buff, sandy, visible......................			5	0
Coal, soft.........................	2′	0″		
Coal, slaty........................	0	5	2	5
Fire clay shale................................			2	6
Shale, sandy.................................			2	0

Wilderness Lumber Co. Coal Opening—No. 126 on Map II.

On west hillside of Meadow River, 0.1 mile northeast of Mine No. 467; **Sewell Coal**; elevation, 1925′ B.; section and sample at face by author.

			Feet.	Inches.
1. Shale, buff, sandy, roof.....................				
2. **Coal**, soft, columnar...........	2′	0″		
3. **Coal**, and slate, mixed (slate floor)	0′	6	2	6

The analysis of a sample (915H) collected from No. 2 of section, as reported by Messrs. Hite and Krak, is given under **Mine No. 126** in Table 1 at the end of this Chapter.

Coal Exposure—No. 468 on Map II.

In Nicholas County, at road fork, east bank of Meadow River, 0.3 mile northeast of Miller; **Sewell Coal**; elevation, 1900′ B.; used in Miller Section, page 175.

	Feet.	Inches.
Shale, brown, sandy		
Coal blossom	2	0

Brackens Creek Coal & Land Co. Coal Prospect—No. 469 on Map II.

On west hillside of Brackens Creek, 1.9 miles southwest of Russellville; **Sewell Coal**; elevation, 1985′ B.; examined by author.

			Feet.	Inches.
Sandstone, visible			10	0
Shale, buff, sandy			11	0
Coal, medium-soft	1′	8″		
Shale, sandy, hard, 6″ to	0	7		
Coal, medium-soft, concealed by water, but reported by A. M. Moore	1	8	3	11
Slate				

Fayetteville District.

In Fayetteville District, the thickness and stratigraphic position of the Sewell Coal are exhibited in the sections published in Chapter IV for South Fayette, Fayetteville—1.5 Miles Northwest, Parral, Carlisle, and Herberton, page references to which are given in the Index; and in the logs of Coal Test Borings Nos. 27-79A on Map II, details of which are published on preceding pages 388A-388B. In the western half of the District, this bed lies below drainage, but the logs of the borings last mentioned give valuable information concerning it in this region and constitute the authority for its minable area as shown on Figure 20. This coal has long been operated on a commercial scale in the area in question, 50 mines having been opened on it by the end of the year 1916. It has also been prospected considerably by natives and the larger land-

PLATE XXIII.—View showing sandstone quarry—No. 9 on Map II—½ mile southwest of Meadowbridge (Clute P. O.) in the Princeton Conglomerate of Mauch Chunk Series; high ridge on left sky-line is in Pocahontas Group.

holding companies. Its description at these commercial mines, prospect openings and other exposures follows.

Coal Opening (Abandoned)—No. 470 on Map II.

On south hillside of New River; opposite mouth of Mill Creek, at Hawks Nest; **Sewell Coal**; elevation, 875′ B.; examined by author.

	Feet.	Inches.
Coal, old abandoned opening at MacDougal, reported	2	6

New River Valley Coal Co. Mine—No. 127 on Map II.

On south hillside of New River, 0.9 mile southeast of Hawks Nest; **Sewell Coal**; elevation, 1040′ B.; section and data as collected by the author in 1907 and published by Dr. White on page 200 of Volume II(A).

				Feet.	Inches.
1.	Sandstone, massive and concealed			300	0
2.	Slate, black			10	0
3.	**Coal**, cannel, hard	0′	4″		
4.	**Coal**, soft, (fire clay floor)	2	4	2	8

"Greatest rise, S. 30° E.; Butts, N. 70° E.; Faces, S. 20° E.; mine capacity, 300 tons; men employed, 75; No. 3 is shipped along with No. 4, mostly east, for domestic purposes. Two samples were obtained, one of Nos. 3 and 4 combined, and one of No. 3 separate, the analysis of the former being published by Dr. White under No. 1, in Table No. 2 on page 214, of Volume II(A). Principal office of Company, Fayette, W. Va.; authority for mine data, V. Bachman, Mine Foreman."

The analysis mentioned above, as reported by Prof. Hite and republished by Dr. White on page 241 of Bulletin 2, is given under **Mine No. 127** in Table 1 at the end of this Chapter.

Marrs Branch Coal Co. "Cataract Mine" (Abandoned)—No. 128 on Map II.

On west hillside of New River at Whitney, 2 miles northwest of Fayette; **Sewell Coal**; elevation, 1155′ L.; section as obtained by author in 1907 and published by Dr. White on page 200 of Volume II(A).

				Feet.	Inches.
1.	Sandstone, massive				
2.	Slate			5	0
3.	**Coal**, bony	0′	3″		
4.	**Coal**, soft, (fire clay floor)	2	10	3	1

"Greatest rise, S. 30° E.; butts, N. 70° E.; faces, S. 20° E.; mine capacity, 100 tons; men employed, 15; run-of-mine shipped mostly east for domestic purposes; sample from No. 4, the analysis of which was published by Dr. White under No. 2 in Table No. 2 on page 214 of Volume II(A) and republished by him under the same number in Table No. 7 on page 241 of Bulletin 2. This mine was formerly owned and operated by the Cataract Colliery Company."

The above-mentioned analysis, as reported by Prof. Hite, is given under **Mine No.** 128 in Table 1 at the end of this Chapter. Through typographical error it was reported in Volume II(A), page 200, as being operated by the Moss Branch Coal Company.

Low Moor Iron Co. "Low Moor No. 2" Mine—No. 129 on Map II.

On west hillside of New River, ¼ mile west of South Fayette; **Sewell Coal**; elevation, 1290′ B.; section and data by author as published by Dr. White on page 201 of Volume II(A).

	Feet.	Inches.
1. Draw slate	0	6
2. **Coal**, soft	3	1

"Greatest rise, S. 30° E.; butts, N. 70° E.; faces, S. 20° E.; mine capacity, 200 tons; men employed, 50; sample from No. 2, the analysis of which was published by Dr. White under No. 3 in Table No. 2 on page 214 of Volume II(A) and republished by him under the same number in Table No. 7 on page 241 of Bulletin 2; fine coal coked at Low Moor, Va., for furnace use; lump coal shipped mostly east for domestic purposes; principal office, Low Moor, Va.; authority for mine data, R. O. Rafter, Mine Foreman."

At the time of the author's visit in 1916, the mine had been idle for 19 months and was just starting up again, according to C. P. Gasten, the present Mine Foreman.

The above-mentioned analysis is given under **Mine No.** 129 in Table 1 at the end of this Chapter.

A sample of coke from this mine was collected by Messrs. Brady and Edmonds in 1902 and analyzed by Prof. Hite, the results being published by Dr. White under No. 12 on pages 663-4 of Volume II and republished by him under the same number on page 214 of Volume II(A) and page 249 of Bulletin 2 of the Survey. This analysis is given under **Mine No.** 129 in Table 2 at the end of this Chapter.

The coal bed at the above mine was also measured and sampled at three points by H. I. Smith, of the U. S. Bureau of Mines, on July 10 and 11, 1912, as given on pages 349-350 of Bulletin 85 of the U. S. Bureau of Mines.

Section A (sample 14401) was measured at the face of left entry 3, off the main entry; thickness of bed and of coal sampled, 3′ 0″.

Section B (sample 14402) was measured at the face of room 9, off left entry 2; thickness of bed and of coal sampled, 2′ 11½″.

Section C (sample 14403) was measured at the face of room 9, off left entry 1, at 150 feet from the entry; thickness of bed and of coal sampled, 3′ 0½″.

A **composite sample** was made by mixing samples 14401, 14402 and 14403, for an ultimate analysis, the results of which are shown under laboratory **No. 14404.**

These four analyses, as taken from page 113 of Bulletin 85 of the U. S. Bureau of Mines, are given under **Mine No. 129** in Table 3 at the end of this Chapter.

For "Notes", see description of **Mine No. 130.**

Low Moor Iron Co. "Pinetop Entry" of "Low Moor No. 2" Mine—No. 471 on Map II.

On southwest side of hill road, 0.4 mile S. 15° W. of South Fayette; **Sewell Coal**; elevation, 1255′ L.; examined by author.

	Feet.	Inches.
Shale, sandy, visible	3	0
Coal, soft, columnar	3	3
Shale, argillaceous, gray	4	0

Low Moor Iron Co. "Kaymoor" Mine No. 1—No. 130 on Map II.

On south hillside of New River, 0.6 mile west of Kaymoor; **Sewell Coal**; elevation, 1490′ B.; section by Messrs. Brady and Edmonds, published by Dr. White on page 658 of Volume II in 1903.

	Feet.	Inches.
Coal	3	9

This mine is over 30 years old and is still in operation. The analysis of a sample of coal collected by Messrs. Brady and Edmonds, as reported by Prof. Hite, and published by Dr. White under No. 19 on pages 658-9 of Volume II and republished by him under the same number on pages 211-212 of Volume II(A) and page 248 of Bulletin 2 of the Survey, is given under **Mine No. 130** in Table 1 at the end of this Chapter.

The analysis of a sample of coke collected by Messrs. Brady and Edmonds, as reported by Prof. Hite and published by Dr. White under No. 10 on pages 663-4 of Volume II and republished by him under the same number on page 214 of

Volume II(A) and page 249 of Bulletin 2, is given under **Mine No. 130** in Table 2 at the end of this Chapter.

This Company now (August, 1916) has a battery of 111 beehive coke ovens at Kaymoor, nearly all of which are in blast; mostly 48-hour coke produced.

The coal bed was also measured and sampled at five points in this mine by H. I. Smith, of the U. S. Bureau of Mines, as given on pages 349-350 of Bulletin 85 of the U. S. Bureau of Mines.

Section A (sample 14294) was measured at the face of room 1, left entry 3, off main entry 3, at 4,700 feet south of the mine mouth; thickness of bed and of coal sampled, 3′ 8½″.

Section B (sample 14295) was measured at the face of right entry 1½, off left entry 1, off Buffalo entry, 3,300 feet southeast of the mine mouth; thickness of bed and of coal sampled, 3′ 10⅝″.

Section C (sample 14296) was measured at the face of left entry 1, off right entry 9, at 3,300 feet west of the mine mouth; thickness of bed and of coal sampled, 3′ 6½″.

Section D (sample 14297) was measured at the face of west entry 11, 3,600 feet southwest of the mine mouth; thickness of bed and of coal sampled, 3′ 3″.

Section E (sample 14299) was measured on the pillar between rooms 3 and 4, off right entry 1, off main entry 7; thickness of bed and of coal sampled, 3′ 4″.

A **composite sample** was made by mixing samples 14294, 14295, 14296, and 14297. The results of an ultimate analysis of this sample are shown under laboratory **No. 14298**.

These 6 analyses, as taken from page 113 of Bulletin 85 of the U. S. Bureau of Mines, are given under **Mine No. 13** in Table 3 at the end of this Chapter.

"Notes.—Kaymoor No. 1 and Low Moor No. 2 mines are opened by slope and the coal is mined by the room-and-pillar system. At the time the mines were visited the coal was undercut by air punchers and electric chain cutters and broken down with FFFF black blasting powder. None of the coal was shipped as run-of-mine. The screening plant had bar screens spaced 4 inches apart through which about 66 per cent. of the coal passed, and also smaller bar screens with spaces 1½ inches wide which produced an egg coal. There were three loading tracks with a capacity for 16 empty and 16 loaded cars. There were storage bins with a capacity for 400 tons of screened coal and 600 tons of screenings. The screenings were not washed but were sent to the coking plant. About 10,000 acres of coal land was owned by the company, of which about 500 acres had been worked. The daily output of No. 1 mine was 550 tons, with a maximum day's run of 750 tons. The output of this mine will probably be increased to about 850 tons in the near future. Daily output of No. 2 mine, about 90 tons. Average thickness about 3 feet 6 inches; slight dip to the west. Roof smooth sandstone 18 inches thick; floor, rough, hard clay. Material from the floor or roof did not become mixed with the coal in mining."

Brown Coal Co. "South Nuttall Mine"—No. 131 on Map II.

On south hillside of New River, at Brown; **Sewell Coal**; elevation, 1595′ B.; section of Messrs. Brady and Edmonds as published by Dr. White on page 658 of Volume II; correlation verified by author.

	Feet.	Inches.
Coal	3	10

This mine has been in operation for over 30 years. The analysis of a sample of coal collected by Messrs. Brady and Edmonds, as reported by Prof. Hite and published by Dr. White under No. 6 on pages 658-9 of Volume II and republished by him under the same number of pages 211-212 of Volume II(A) and page 248 of Bulletin 2 of the Survey, is given under **Mine No. 131** in Table 1 at the end of this Chapter.

The coal bed was also measured and sampled at five points in this mine by A. C. Ramsay and R. Y. Williams, of the U. S. Geological Survey, on July 10, 1909, as given on pages 946-7 of Bulletin 22 of the U. S. Bureau of Mines.

Section A (sample 8142) was cut from the face of the Wheeler entry, 3,500 feet from drift mouth; thickness of bed and of coal sampled, 3′ 2½″.

Section B (sample 8143) was cut from the face of entry 18, 1,000 feet from drift mouth; thickness of bed and of coal sampled, 3′ 2″.

Section C (sample 8144) was cut from the face of the old Lockett entry, 4,000 feet from drift mouth; thickness of bed and of coal sampled, 3′ 6¼″.

Section D (sample 8145) was cut from the face of left entry 1, 1,800 feet from drift mouth; thickness of bed and of coal sampled, 3′ 0⅝″.

Section E (sample 8607) was cut from the face of entry 18, 1,000 feet from secondary opening; thickness of bed and of coal sampled, 3′ 5½″.

A **composite sample** was made by mixing samples 8142, 8144, and 8145 for an ultimate analysis, the results of which are shown under laboratory **No. 8196.** The latter analysis along with an air-dried calculation of the same was published by Dr. White under No. 6 in Table No. 8 on page 243 of Bulletin 2 of the W. Va. Geological Survey.

The above 6 analyses, as taken from page 240 of Bulletin 22 of the U. S. Bureau of Mines and the air-dried calculation of sample No. 8196 from Bulletin 2 as mentioned above, are given under **Mine No. 131** in Table 3 at the end of this Chapter.

"Notes.—The coal at this mine was undercut with chain machines in bottom part of bed and was shot down with black powder. The tipple was not equipped with screens; therefore the entire output was shipped as run-of-mine coal. This is a coking coal, but there were no ovens at this plant. The daily output in July, 1909, averaged 550 tons, and 647 tons was the maximum day's run. The output for some time was to be derived mainly from advance work. Thickness nearly uniform, ranging as mined from 3′ 2″ to 4′ 0″; dip 1½° NW; roof, strong blue shale, which did not fall with the coal and which had a cap rock 6 feet above; floor, hard underclay with smooth surface; cover, for the most part, about 350 feet thick."

The bed was also measured and sampled at five points in this mine by J. J. Rutledge of the U. S. Bureau of Mines, on June 22, 1910, as given on pages 350-1 of Bulletin 85 of the Bureau of Mines.

Section A (sample 10618) was measured at the face of room 2 off Hill entry; thickness of bed, 3′ 6″; thickness of coal sampled, 2′ 10″.

Section B (sample 10619) was measured on rib of Lockett heading, between rooms 1 and 2, about 2,000 feet from mouth of entry; thickness of bed and of coal sampled, 3′ 9⅝″.

Section C (sample 10620) was measured at the neck of room 1, off right entry 6, off Wheeler entry; thickness of bed and of coal sampled, 3′ 5″.

Section D (sample 10621) was measured at the neck of room 4, off left entry 2, off entry 18; thickness of bed and of coal sampled, 3′ 6″.

Section E (sample 10622) was measured on the left rib near the face of entry 18; thickness of bed and of coal sampled, 3′ 5½″.

A composite sample was made by mixing samples 10618 to 10622, inclusive; the results of an ultimate analysis of this sample are given under laboratory No. 10623.

These six analyses, as taken from page 113 of Bulletin 85 of the U. S. Bureau of Mines, are also given under **Mine No. 131** in Table 3 at the end of this Chapter.

"Notes.—The coal is mined by the room-and-pillar and modified panel system; at the time of sampling FFF blasting powder was used for breaking down the coal after undercutting with electric chain cutters. The coal was screened on 1½-inch bar screens, and marketed as lump and screenings; pickers were employed on the cars when loading; there were two loading tracks with capacity for about 20 cars. Output 550 tons per day. Thickness, 3 to 4 feet; dip 3° west; small faults; roof, blue shale 6 feet thick, strong and smooth; floor hard, smooth clay; cover, 120 to 350 feet."

Branch Coal Co. "Chapman Mine"—No. 132 on Map II.

On west hillside of New River, 0.4 mile N. 35° W. of Elverton; **Sewell Coal**; elevation, 1570′ B.; section by Messrs. Brady and Edmonds, as published by Dr. White on page 658 of Volume II; correlation verified by author.

	Feet.	Inches.
Coal	2	8½

The analysis of a sample of coal collected at this mine by Messrs. Brady and Edmonds, as reported by Prof. Hite and published by Dr. White under No. 9 on pages 658-9 of Volume II and republished by him under the same number on pages 211-212 of Volume II(A) and page 248 of Bulletin 2 of the Survey, is given under **Mine No. 132** in Table 1 at the end of this Chapter. At the time the mine was visited in 1902 it was being operated by the Chapman Coal and Coke Company.

Messrs. Brady and Edmonds also collected a sample of the coke made at this mine, the results of an analysis of which by Prof. Hite, as published by Dr. White under No. 10 on pages 663-4 of Volume II and republished by him under the same number on page 214 of Volume II(A) and page 249 of Bulletin 2 of the Survey, are given under **Mine No. 132** in Table 2 at the end of this Chapter.

The coal bed was also measured and sampled at four points in this mine by G. H. Deike, of the U. S. Bureau of Mines, on July 10, 1912, as given on pages 347-8 of Bulletin 85 of the Bureau of Mines.

Section A (sample 14338) was measured at the face of the old Bayne entry, 3,900 feet southwest of No. 2 entrance; thickness of bed and of coal sampled, 3′ 4¾″.

Section B (sample 14339) was measured at the corner of the break-through, 10 feet from the face of the main entry, 3,900 feet southwest of No. 2 entrance; thickness of bed and of coal sampled, 3′ 2⅜″.

Section C (sample 14341) was measured on pillar of room 2, left entry 1, off entry 5, 3,100 feet south of No. 2 entrance; thickness of bed and of coal sampled, 4′ 2⅝″.

Section D (sample 14342) was measured on the pillar of room 3, right entry 5, 3,100 feet southwest of No. 2 entrance; thickness of bed and of coal sampled, 4′ 7½″.

Two **composite samples** were made: (1) by mixing samples 14338 and 14339 for an ultimate analysis, the results of which are shown under laboratory **No. 14340**; (2) by mixing samples 14341 and 14342 for an ultimate analysis, the results of which are shown under laboratory No. 14343.

These 6 analyses, as taken from page 112 of Bulletin 85 of the U. S. Bureau of Mines, are given under **Mine No. 132** in Table 3 at the end of this Chapter.

"Notes.—The Elverton ('Chapman') mine is opened by a drift entry and the coal mined by the room-and-pillar system. At the time of sampling the coal was undercut both by hand and by electric chain machines and broken with FFF black powder. Dynamite was used for brushing the roof. The tipple was equipped with shaking screens 5 by 12 feet with openings 5 inches in diameter and also another set of screens 5 by 12 feet with openings 1¼ inches in diameter. About 50 per cent. of the coal passed through the first set of screens. None of the coal was shipped as run-of-mine. Pickers were employed on the cars when loading coal. The screenings were used for making coke. The coal was very clean, the lumps large, and presented a good appearance on the cars. There were 3 loading tracks with a capacity of 30 empty and 40 loaded cars. There were also storage bins with a capacity for 400 tons of coal. There was about 700 acres of coal tributary to this mine. About one-half of the coal was derived from advance workings and the remainder from pillars. The production of the mine was 250 tons a day with a maximum day's run of 650 tons. Average thickness, 4 feet; dip 1½ per cent. northwest. Roof, heavy, smooth shale, above which there is a sandstone cap rock. The coal is practically free from regular partings or impurities. The floor consists of about 4 inches of bony coal, below which is a hard smooth shale. Cover, at points where the samples were taken, ranges from 100 to 400 feet."

Southside Co. "Southside Mine"—No. 133 on Map II.

On west hillside of New River, opposite Caperton; **Sewell Coal**; elevation, 1660′ B.; section by author.

			Feet.	Inches.
1.	Shale, sandy, and sandstone, shaly, visible...		13	0
2.	**Coal**, soft, columnar............	3′ 5″		
3.	Coal, slaty....................	0 4	3	9
4.	Shale		5	0
5.	Sandstone		5	0

No. 3 of section is reported to disappear and No. 2 to average 3′ 8″ in mine.

The analysis of a sample of coal collected at the above mine in 1902, cut from a mining section of 3′ 9″, by Messrs. Brady and Edmonds, as reported by Prof. Hite and published by Dr. White under No. 11 (Victoria Coal & Coke Co.) on pages 658-9 of Volume II and republished by him under the same number on pages 211-212 of Volume II(A) and page 248

of Bulletin 2 of the Survey, is given under **Mine No. 133** in Table 1 at the end of this Chapter.

This mine was also formerly owned by the Chapman Coal, Coke and Iron Company.

The bed was also measured and sampled at three points in this mine by R. Y. Williams, of the U. S. Geological Survey, on July 9, 1909, as given on page 946 of Bulletin 22 of the U. S. Bureau of Mines.

Section A (sample 8151) was cut from the face of the straight entry, 5,000 feet from drift mouth; thickness of bed and of coal sampled, 3′ 4⅝″.

Section B (sample 8152) was cut from the face of left entry 5, 7,000 feet from drift mouth; thickness of bed and of coal sampled, 4′ 10⅛″.

Section C (sample 8153) was cut from the face of the machine entry, 6,000 feet from drift mouth; thickness of bed and of coal sampled, 4′ 0″.

A **composite sample** was made by mixing samples 8151, 8152, and 8153 for an ultimate analysis, the results of which are shown under laboratory **No. 8185.** The latter analysis along with an air-dried calculation of the same was published by Dr. White under No. 26 in Table No. 8 on page 245 of Bulletin 2 of the W. Va. Geological Survey.

These 4 analyses by the U. S. Geological Survey, as taken from page 239 of Bulletin 22 of the U. S. Bureau of Mines, together with the air-dried calculation of sample No. 8185 above mentioned, are given under **Mine No. 133** in Table 3 at the end of this Chapter.

"Notes.—The coal at this mine was undercut by hand and chain machines, and was shot down with a short-flame explosive or black powder. The tipple had no screens, the entire output being shipped as run-of-mine coal. This is a coking coal, but there were no ovens at this plant. The coal was picked on the car. The daily output in 1909 at time of sampling averaged 450 tons, and 550 tons was a maximum day's run. The future output was to be derived from both advance work and pillars. Thickness, fairly uniform, ranging as mined from 3 feet 4 inches to 4 feet; dip, 1¾° NW; roof, stony gray shale, which did not fall with the coal; floor, hard clay, underlain with shale."

Coal Opening—No. 472 on Map II.

On north bank of branch of Coal Run, 1.6 miles S. 35° W. of Caperton; **Sewell Coal**; elevation, 1670' L.; examined by author.

	Feet.	Inches.
Sandstone, flaggy and shaly, visible	15	0
Coal, medium-soft, columnar	3	7
Slate, to bed of run	3	0

Scotia Coal Co. "Cunard Mine"—No. 134 on Map II.

On branch of Coal Run, 0.6 mile west of Sewell; **Sewell Coal**; elevation, 1710' B.; section by Messrs. Brady and Edmonds; correlation verified by author.

	Feet.	Inches.
Coal	4	2

The above mine was formerly owned by the Cunard Coal Company. The old "Cunard" Mine has been mined out, connected with "Brooklyn" mine (No. 135 on Map II) of Scotia Coal Company, and abandoned some years. Opening bears S. 30° E., and is driven through from river front.

The analysis of a sample of coal collected at the above mine in 1902 by Messrs. Brady and Edmonds, as reported by Prof. Hite and published by Dr. White under No. 12 on pages 658-9 of Volume II and republished by him under the same number on pages 211-212 of Volume II(A) and page 248 of Bulletin 2 of the Survey, is given under Mine No. 134 in Table 1 at the end of this Chapter.

Scotia Coal Co. "Brooklyn Mine"—No. 135 on Map II.

On west hillside of New River, 0.4 mile northwest of Finlow P. O. (Brooklyn); **Sewell Coal**; elevation, 1750' B.; section by Messrs. Brady and Edmonds; correlation verified by author.

	Feet.	Inches.
Coal	4	1

This mine was formerly owned by the Brooklyn Coal and Coke Company. The analysis of a sample of coal collected at this mine in 1902 by Messrs. Brady and Edmonds, as reported by Prof. Hite and published by Dr. White under No. 13 on pages 658-9 of Volume II and republished by him under the same number of pages 211-212 of Volume II(A) and page 249

of Bulletin 2 of the Survey, is given under **Mine No. 135** in Table 1 at the end of this Chapter.

Messrs. Brady and Edmonds also collected a sample of the coke manufactured at this mine, the analysis of which by Prof. Hite, as published by Dr. White under No. 9 on pages 663-4 of Volume II and republished by him under the same number on page 214 of Volume II(A) and page 249 of Bulletin 2 of the Survey, is given under **Mine No. 135** in Table 2 at the end of this Chapter.

The bed was also measured and sampled at two points in the mine by K. M. Way, of the U. S. Geological Survey, on September 14, 1907, as given on pages 916-917 of Bulletin 22 of the U. S. Bureau of Mines and on pages 12-13 of Bulletin 362 of the U. S. Geological Survey.

Section A (sample 5329) was measured in the face of left entry 5, 3,000 feet east of the drift mouth; thickness of bed and of coal sampled, 3′ 11½″.

Section B (sample 5432) was measured in the face of right entry 1, 1500 feet west of the drift mouth; thickness of bed and of coal sampled, 4′ 0″.

The bed was also measured and sampled at three points by C. A. Fisher, of the U. S. Geological Survey, on July 4, 1909, as given on pages 916-917 of Bulletin 22 of the U. S. Bureau of Mines.

Section A (sample 8092) was cut from left heading 2, and represented 4 feet 2 inches of coal.

Section B (sample 8093) was cut from the face of straight entry 7, and represented 3 feet 9 inches of coal.

Section C (sample 8094) was cut from right block entry 1, and represented 3 feet 8½ inches of coal.

A composite sample was made by mixing both face and pillar samples 8092, 8093, and 8094 for an ultimate analysis, the results of which are shown under laboratory **No. 8159.**

Two car samples (Nos. 5453 and 5480) were also collected from two cars of run-of-mine coal, loaded under the supervision of Inspector K. M. Way and shipped to the U. S. Fuel-Testing Plant at Norfolk, Virginia, one car being exposed to the weather for twenty-two days and the other twenty-eight days before arriving at the testing plant. Producer-gas and briquetting tests were to be made on this shipment, as noted under Jamestown No. 5 on pages 12-13 of Bulletin 362 of the U. S. Geological Survey.

The above 8 analyses by the U. S. Geological Survey, as taken from page 226 of Bulletin 22 of the U. S. Bureau of Mines, are given under **Mine No. 135** in Table 3 at the end of this Chapter.

"Notes.—About 50 per cent. of the output of this mine was shipped as run-of-mine coal. The remainder was screened and the slack was coked. The coal was picked on the car by two trimmers. The daily output in July, 1909, averaged about 350 tons, and 500 tons was a maximum day's run. Increase of capacity was contemplated. The probable life of the mine was estimated at 20 years. At this mine the bed lies nearly flat, having about 3½ feet thickness. Roof, sandstone, or sandstone underlain with clay to which the coal sticks somewhat; floor, fire clay or smooth, soft shale which does not mix with coal in mining."

Briquetting Tests (Sewell Coal).

The following results of briquetting tests of two cars of coal from this mine, published under Jamestown No. 5, are taken from pages 19-20 of Bulletin 385 of the U. S. Geological Survey:

"Of the two tests made on this coal, the briquets of test No. 258 were better than those of test No. 259. The warm briquets of test No. 258 had smooth surfaces and were difficult to fracture. The cold briquets were very hard and brittle and formed some slack when broken. The warm briquets from test No. 259 had smooth surfaces, were very plastic, and high in moisture; the cold briquets had a very hard, firm surface, and fractured without slacking."

Briquet Tests.

Test No.	258	259
Size of coal as used:		
Over 1-4 inch ... per cent.	0.1	....
1-10 to 1-4 inch ... per cent.	6.5	....
1-20 to 1-10 inch ... per cent.	27.0	....
1-40 to 1-20 inch ... per cent.	31.1	....
Through 1-40 inch ... per cent.	35.3	....
Details of manufacture:		
Machine used	Am.	Am.
Briquetting temperature ... °F.	199	200
Binder:		
Kind	W. G. P.	W. G. P.
Laboratory No. (see U. S. Bull. 385)	5563	5458
Amount ... per cent.	7	7
Weight of—		
Fuel briquetted ... pounds	136,000	2,000
Briquets, average ... pounds	0.568	0.588
Heat value per pound:		
Coal as received ... B. T. U.	14,522	14,522
Briquets ... B. T. U.	14,542	....
Binder ... B. T. U.	16,718	16,893
Moisture in briquet mixture ... per cent.	6.14	....
Drop test (1-inch screen):		
Held ... per cent.	70.0	48.5
Passed ... per cent.	30.0	51.5
Tumbler test (1-inch screen):		
Held ... per cent.	71.5	67.5
Passed ... per cent.	28.5	32.5
Loss through [illegible] ... per cent.	95.5	95.2
Weathering test:		
Time exposed ... days	154	154
Condition	A	A
Water absorption:		
Time immersed ... days	21	21
Water absorbed ... per cent.	14.29	15.28
Average for first four days ... per cent.	2.52	2.62
Specific gravity (apparent)	1.092	1.103

Chemical Analyses of Briquets, Test No. 258, Lab. No. 5744.

Proximate:	Per cent.	Ultimate:	Per cent.
Moisture	1.32	Hydrogen	4.90
Volatile Matter	24.97	Carbon	82.77
Fixed Carbon	67.91	Nitrogen	1.14
Ash	5.80	Oxygen	4.76
Sulphur	0.63		

Extraction Analyses.

	Pitch.	Fuel	Briquets
		J-5.	Test 258.
Laboratory No.	5563	5453	5744
Air-drying loss . . . . . Per cent.	0	2.60	0.90
Extracted by CS_2:			
Air dried . . . . . do.	90.33	0.514	6.68
As received . . . . . do.	90.33	0.514	6.62
Pitch in briquet as received . . . . . do.	.....	.....	6.81

Scotia Coal Co. Mine—No. 136 on Map II, on head of Rush Run, 1.5 miles northwest of Red Ash, at an elevation of 1770′ B., was a new operation in the **Sewell Coal,** the incline being extended from the old "Red Ash" Mine (No. 187 on Map II) in the Fire Creek Coal to the top of the hill.

Rocklick Coal Co. "Concho Mine"—No. 137 on Map II.

On west hillside of New River, 0.8 mile N. 10° W. of Thurmond; **Sewell Coal**; elevation, 1775′ B.; section by Messrs. Brady and Edmonds; correlation verified by author.

	Feet.	Inches.
Coal	5	1

This mine was formerly the No. 3 mine of the Thurmond Coal Company and had been in operation 27 or 28 years in October, 1916. The name was changed in 1914 to the present one when the opening was driven through to Rocklick Creek.

The analysis of a sample of coal collected by Messrs. Brady and Edmonds, as reported by Prof. Hite and published by Dr. White under No. 25 on pages 658-9 of Volume II and republished by him under the same number on pages 212-213 of Volume II(A) and page 248 of Bulletin 2 of the Survey, is given under **Mine No. 137** in Table 1 at the end of this Chapter.

Rocklick Coal Co. "Rocklick Mine"—No. 138 on Map II.

On head of Rocklick Creek, 2.2 miles N. 20° W. of Thurmond; **Sewell Coal**; elevation, 1670′ B.; examined by author.

	Feet.	Inches.
Slate, sandy..................................		
Coal, soft, columnar (slate floor) 3′ 8″ to.........	4	8

New River & Pocahontas Consolidated Coal Co. "Minden No. 5" Mine—No. 139 on Map II.

On north bank of Arbuckle Creek, east edge of Minden; **Sewell Coal**; elevation, 1613′ L.; section by Teets measured about 200 feet underground in main heading.

			Feet.	Inches.
Coal, sulphurous, (slate roof)......	0′	4″		
Coal, soft (slate floor).............	4	4	4	8

For mine data, see Minden No. 2 (No. 142 on Map II).

This mine was formerly operated by W. P. Rend.

The bed was also measured and sampled at three points in this mine by J. J. Rutledge, of the U. S. Geological Survey, on June 23, 1909, as given on pages 934-5 of Bulletin 22 of the U. S. Bureau of Mines.

Section A (sample 8032) was cut from face of left entry 6, 1,500 feet northwest of drift mouth; thickness of bed and of coal sampled, 4′ 5″.

Section B (sample 8033) was cut from face of right heading 7, 850 feet northeast of drift mouth; thickness of bed and of coal sampled, 3′ 3½″.

Section C (sample 8034) was cut from face of main heading, 4,000 feet north of drift mouth; thickness of bed, 4′ 3¾″; thickness of coal sampled, 4′ 2¼″.

A **composite sample** was made by mixing samples 8032, 8033 and 8034 for an ultimate analysis, the results of which are shown under laboratory **No. 8101**.

These 4 analyses, as taken from page 235 of Bulletin 22 of the U. S. Bureau of Mines, are given under **Mine No. 139** in Table 3 at the end of this Chapter.

Notes.—The coal at this mine was undercut by hand and machine at the bottom of the bed, and was shot down with black powder. The tipple was equipped with 1½- and ¾-inch screens. There were no coking ovens at this mine. The estimated output in 1909 was 550 tons, but the capacity was 600 tons daily. The future output was to be derived from advance work. The thickness ranges from 3 to 4½ feet. The roof is either sandstone or shale of fairly good quality according to locality. The floor is a hard gray shaly underclay with a smooth surface."

New River & Pocahontas Consolidated Coal Co. "Minden No. 4 Mine"—No. 140 on Map II.

On south bank of Arbuckle Creek, south edge of Minden; **Sewell Coal**; elevation, 1624′ L.; section measured by Teets 200 feet underground in main heading.

			Feet.	Inches.
Coal, sulphurous (slate roof)	0′	4″		
Coal (slate floor)	4	4	4	8

For mine data, see Minden No. 2 **(No. 142 on Map II).**

This mine was formerly operated by W. P. Rend. The coal bed was also measured and sampled at three points in this mine by J. J. Rutledge and A. J. Hazlewood, of the U. S. Geological Survey, on July 25, 1909, as given on pages 933-4 of Bulletin 22 of the U. S. Bureau of Mines.

Section A (sample 8029) was cut from the face of left entry 4, 3,000 feet northwest of drift mouth; thickness of bed, 4′ 3½″; thickness of coal sampled, 4′ 2″.

Section B (sample 8030) was cut from face of room 5, off right entry 9, southeast of drift mouth; thickness of bed and of coal sampled, 4′ 4¼″.

Section C (sample 8031) was cut from face of main heading, 5,000 feet northeast of drift mouth; thickness of bed and of coal sampled, 3′ 11½″.

A **composite sample** was made by mixing samples 8029, 8030, and 8031 for an ultimate analysis, the results of which are shown under laboratory **No. 8102.** The latter analysis along with an air-dried calculation of the same was published by Dr. White under No. 36 in Table No. 8 on page 245 of Bulletin 2 of the W. Va. Geological Survey.

These 4 analyses, taken from pages 234 and 235 of Bulletin 22 of the U. S. Bureau of Mines, as also the above-mentioned air-dried calculation of sample No. 8102, are given under **Mine No. 140** in Table 3 at the end of this Chapter.

"Notes.—The coal was undercut by hand in No. 4 mine (No. 140 on Map II) and by machine in No. 3 mine (No. 141 on Map II), in the lower part of the bed, and was shot down with black powder. Both mines used the same tipple, which was equipped with screens with ¾- and 1½-inch openings. There was a bank of coke ovens below the mines, but they were not in use at time of sampling in 1909. The estimated daily output averaged 550 tons at No. 3 mine and 600 tons at No. 4 mine, while the capacities were 600 and 700 tons, respectively. The output in the immediate future was to be derived from advance work. The thickness of the coal ranges from 3 to 3½ feet. The roof is a dark shale of good quality. The floor is a hard underclay with a smooth surface."

New River & Pocahontas Consolidated Coal Co. "Minden No. 3" Mine—No. 141 on Map II.

On south bank of Arbuckle Creek, 0.9 mile west of Rocklick Creek; **Sewell Coal**; elevation. 1591' L.; section measured by Teets 300 feet underground on main heading.

			Feet.	Inches.
Coal, sulphurous, (slate roof)	0'	4"		
Coal, soft, (fire clay floor)	4	3	4	7

"Some of this coal is reported as having from 2" to 14" of bone about 1 foot from top."

For mine data, see "Minden No. 2" (No. 142 on Map II). It was formerly operated by W. P. Rend.

The coal bed was also measured and sampled at four points in this mine by J. J. Rutledge and A. J. Hazlewood, of the U. S. Geological Survey, on July 25, 1909, as given on pages 933-4 of Bulletin 22 of the U. S. Bureau of Mines.

Section A (sample 8027) was cut from face of left entry 7, 3,000 feet east of drift mouth; thickness of bed, 4' 10¾"; thickness of coal sampled, 4' 5¼".

Section B (sample 8028) was cut from face of right air-course 8, in break-through No. 1; thickness of bed, 5' 0"; thickness of coal sampled, 4' 2".

Section C (sample 8381) was cut from crosscut in right heading 5, 2,400 feet west of drift mouth; thickness of bed and of coal sampled, 4' 7".

Section D (sample 8880) was cut from face of a room off left entry 4, 1,300 feet southeast of drift mouth; thickness of bed and of coal sampled, 4' 3".

A **composite sample** was made by mixing samples 8027 and 8028 for an ultimate analysis, the results of which are shown under laboratory **No. 8249**. The latter analysis along with an air-dried calculation of the same, was published by Dr. White under No. 35 in Table No. 8 on page 245 of Bulletin No. 2 of the W. Va. Geological Survey.

These 5 analyses, as taken from pages 234 and 235 of Bulletin 22 of the U. S. Bureau of Mines, together with the air-dried calculation of sample No. 8249 above mentioned, are given under **Mine No. 141** in Table 3 at the end of this Chapter.

For "Notes," see Minden No. 4 (No. 140 on Map II).

New River & Pocahontas Consolidated Coal Co. "Minden No. 2 Mine"—No. 142 on Map II.

On north bank of Arbuckle Creek, west edge of Minden; **Sewell Coal**; elevation, 1583′ L.; section measured by Teets about 300 feet underground in main heading.

			Feet.	Inches.
Coal, sulphurous (slate roof)	0′	4″		
Coal (slate floor)	4	8	5	0

"Report on the 4 mines, Minden Nos. 2, 3, 4, and 5, of New River and Pocahontas Consolidated Coal Company; originally Arbuckle Creek Mines; formerly owned by W. P. Rend; since 1906, by the present Company; principal office, Philadelphia, Pa., also an office in Charleston, W. Va.; used for steam and domestic purposes; shipped east; number of men, 400 miners, 200 day men; electric haulage; output, 2600 tons per day; capacity, 3500 tons per day; leased from W. D. Thurmond Heirs; about the same production at each mine; John Clapperton, Superintendent, authority for mine data."

Messrs. Brady and Edmonds also reported a thickness of 5′ 0″ of coal when they visited the mine in 1902, as published by Dr. White under No. 21 on pages 658-9 of Volume II along with the analysis of a sample collected by them as reported by Prof. Hite. This analysis was republished under the same number on pages 211-212 of Volume II(A) and page 244 of Bulletin 2 of the W. Va. Geological Survey. It is given under **Mine No. 132** in Table 1 at the end of this Chapter.

The analysis of a sample of coke collected by Messrs. Brady and Edmonds, as reported by Prof. Hite and published by Dr. White under No. 8 on pages 633-4 of Volume II and republished by him under the same number on page 214 of Volume II(A) and page 249 of Bulletin 2 of the Survey, is given under **Mine No. 142** in Table 2 at the end of this Chapter.

The coal bed was measured and sampled at five points in this mine by J. J. Rutledge and A. J. Hazlewood, of the U. S. Geological Survey, on June 22, 1909, as given on pages 932-3 of Bulletin 22 of the U. S. Bureau of Mines.

Section A (sample 8024) was cut from the face of left air-course 9, 3,200 feet southeast of drift mouth; thickness of bed and of coal sampled, 3′ 11¼″.

Section B (sample 8025) was cut from the face of left entry 1, 3,000 feet southeast of drift mouth; thickness of bed and of coal sampled, 4′ 1½″.

Section C (sample 8026) was cut from face of right air-course 6, 2,800 feet northwest of drift mouth; thickness of bed, 5′ 6½″; thickness of coal sampled, 5′ 2¼″.

Section D (sample 8881) was cut from face of left entry 4, 2,100 feet southeast of drift mouth; thickness of bed and of coal sampled, 4′ 11″.

Section E (sample 8882) was cut from the face of entry 7, 1,600 feet from drift mouth; thickness of bed and of coal sampled, 5′ 0½″.

A **composite sample** was made by mixing samples 8024, 8025, and 8026 for an ultimate analysis, the results of which are shown under laboratory **No. 8107.** The latter analysis, along with an air-dried calculation of the same, was published by Dr. White under No. 11 in Table No. 8 on page 244 of Bulletin 2 of the W. Va. Geological Survey.

These 6 analyses taken from page 234 of Bulletin 22 of the U. S. Bureau of Mines, together with the air-dried calculation of sample No. 8107 mentioned above, are given under **Mine No. 142** in Table 3 at the end of this Chapter.

"Notes.—The coal at this mine was undercut by hand and machine in the bottom part of the bed, and was shot down with black powder. The tipple was equipped with bar screens with 1½- and ¾-inch openings. The total output of the mine was screened. It was picked on the car by four trimmers. The coal is a coking coal, but no coke was being made at the time of sampling in June, 1909. The daily output averaged 70 tons. The future output was to be derived from advance workings. Thickness, 2¾ feet to 3½ feet; roof, dark shale, between which and the coal is a 3-inch layer of draw slate; floor, hard gray underclay with rough surface."

Minden Mines.

In Table No. 3, following Mine No. 142, are given four analyses of car samples, **Nos. 5774, 5775, 5776, and 5777,** of run-of mine coal shipped "from a mine working the Fire Creek and Sewell beds at Minden", taken from page 235 of Bulletin 22 of the U. S. Bureau of Mines, where they were republished from pages 21-22 of Bulletin 362 of the U. S. Geological Survey. In the latter citation, it is stated: "It was loaded, uninspected, by the operator and the entire shipment was made into briquets and delivered to the Chesapeake and Ohio Railway for trial under locomotive boilers." The briquetting tests were published in Bulletin 385 of the U. S. Geological Survey, pages 33-34, where it is stated the "sample consisted of several cars of semibituminous run-of-mine coal from a mine working the Sewell bed, Minden, Fayette County. . . . "

It is therefore impossible to state from which of the Minden Mines these cars of coal were shipped, but there seems to be no doubt as to the coal being from the Sewell bed. The briquetting tests warrant their publication without reference to the particular mine.

Briquetting Tests.

Jamestown No. 15.

Test No. 280. Owing to the presence of an excessive amount of moisture in this coal, it was very difficult to make satisfactory briquets on the English machine. Water-cracks formed, and the briquets had a porous surface which was easily rubbed off. They were easily broken, forming considerable slack. As the flowing point of the binder used in this test was 194° F., the briquetting temperature of 187° F. was not high enough to soften the pitch sufficiently to obtain the best results.

Test No. 281. The briquets which were made on the American machine were probably stronger than those of test No. 280, made on the English machine, but the sample saved for the physical tests was mislaid, making it impossible to apply the tests. The briquets were very hard and showed no water cracks, although the coal was very wet.

Briquet Tests.

Test No.	280	281
Size of coal as used:		
Over 1-4 inch per cent.	0.1	0.0
1-10 to 1-4 inch per cent.	8.9	5.1
1-20 to 1-10 inch per cent.	27.1	28.6
1-40 to 1-20 inch per cent.	27.0	32.8
Through 1-40 inch per cent.	36.9	33.5
Details of manufacture:		
Machine used	Eng.	Am.
Briquetting temperatiure °F.	187	190
Binder—		
Kind	W. G. P.	W. G. P.
Laboratory No. (see p. 8, Bull. 385)	5941	5941
Amount per cent.	6	6
Weight of—		
Fuel briquetted pounds	65,800	300,000
Briquets, average pounds	3.57	0.720
Heat value per pound—		
Coal as received B. T. U.	14.009	14,009
Briquets B. T. U.	14,548	14,575
Binder B. T. U.	16,978	16,978
Moisture in briquet mixture per cent.	7.04	6.87
Drop test (1-inch screen):		
Held per cent.	19.6	....
Passed per cent.	80.4	....

Test No.	280	281
Tumbler test (1-inch screen):		
Held ... per cent.	48.8	....
Passed ... per cent.	51.2	....
Fines through 10-mesh sieve ... per cent.	88.9	....
Weathering test:		
Time exposed ... days	137	125
Conditions ...	B	B
Water absorption:		
Time immersed ... days	5	11
Water absorbed ... per cent.	7.87	12.01
Average for first four days ... per cent	1.95	2.292
Specific gravity (apparent) ...	1.185	1.079

Chemical Analyses of Briquets.

Test No. ...	280	281
Laboratory No. ...	5857	5859
Proximate:	Per cent.	Per cent.
Moisture ...	1.09	3.21
Volatile Matter ...	18.70	19.49
Fixed Carbon ...	73.60	72.67
Ash ...	6.61	4.63
Sulphur ...	0.95	0.68
Ultimate:		
Hydrogen ...	4.70	4.83
Carbon ...	80.88	81.97
Nitrogen ...	1.20	1.27
Oxygen ...	5.66	6.62

Extraction Analyses.

	Pitch	Fuel	Briquets	
		J-15	Test 280	Test 281
Laboratory No. ...	5941	5774	5857	5859
Air drying loss ... per cent.	0	3.00	0.40	2.50
Extracted by CS_2				
Air dried ... per cent	98.44	0.43	5.57	5.92
As received ... per cent.	98.44	0.42	5.54	5.77
Pitch in briquet as received ... per cent	....	....	5.22	5.46

New River Co. "Lochgelly Mine"—Formerly Stuart Colliery Co. "Stuart Shaft"—No. 143 on Map II.

On head of Wolf Creek, at Lochgelly (formerly Stuart); **Sewell Coal**; elevation, 1371′ L.; depth from surface to bottom of Sewell Coal, 571.12′; examined by author.

				Feet.	Inches.
1.	Slate, fair roof ...				
2.	**Coal**, soft, bright ...	1′	6″		
3.	**Coal**, gray, harder ...	1	7		
4.	**Coal**, soft, (fire clay floor) ...	1	6	4	7

"Greatest rise, S. 40° E.; sample from Nos. 2, 3, and 4, the analysis of which was published by Dr. White under No. 7 in Table No. 2 on page 214 of Volume II(A); mine capacity, 400 tons; coal shipped east mostly for steam; authority for mine data, S. A. Smiley, Bookkeeper, for the company."

The above information was collected by the writer in 1907 as published by Dr. White on page 204 of Volume II(A) about 2 months after the disastrous explosion on January 28, 1907, when 90 miners lost their lives. The Stuart Shaft is 5620 feet N. 68½° E. from the Parral Shaft (now Summerlee) which was then owned by the same Company; namely, the Stuart Colliery Company, of Macdonald, W. Va. The New River Company took over the operation of the mine soon after the date mentioned above.

Teets secured the following information concerning this mine in 1916:

> "Used for domestic and steam purposes; shipped east and west; output, 500 tons daily; capacity, 800 tons daily; number of men employed, 70 miners and 65 day men; electric haulage; lease coal from the Stuart Colliery Company; J. R. Porter, Superintendent, authority for data."

The analysis of the sample collected by the writer in 1907, which was also republished under No. 7 on page 241 of Bulletin 2, mentioned above, is given under **Mine No. 143** in Table 1 at the end of this Chapter.

The coal bed was also measured and sampled at one point in this mine by P. M. Riefkin, and at one point by F. J. Simington, of the U. S. Geological Survey, on June 1, 1909, and at one point by F. J. Simington on July 2, 1909, as given on page 948 of Bulletin 22 of the U. S. Bureau of Mines.

Section A (**sample 7872**) was cut from face of left entry 4, about 2,500 feet northeast of shaft; thickness of bed and of coal sampled 3′ 9$\frac{9}{16}$″.

Section B (**sample 7873**) was cut from face of left entry 1, about 1,500 feet northeast of shaft; thickness of bed and of coal sampled, 4′ 7″.

Section C (**sample 8079**) was cut from rib near face of right entry 3, off main east entry, about 1,200 feet southeast of shaft; thickness of bed and of coal sampled, 2′ 10⅜″.

A **composite sample** was made by mixing samples 7872, 7873, and 8079 for an ultimate analysis, the results of which are shown under laboratory **No. 8158.** The latter analysis, along with an air-dried calculation of the same, was published by Dr. White under No. 13 in Table No. 8 on page 244 of Bulletin 2 of the W. Va. Geological Survey.

These 4 analyses, as taken from pages 240 and 241 of Bulletin 22 of the U. S. Bureau of Mines, together with the air-dried calculation above mentioned, are given under **Mine No. 143** in Table 3 at the end of this Chapter.

"Notes.—The coal was undercut in bed by punchers and by hand, and was shot down with a permissible explosive. The tipple had bar screens with 4-inch and 2-inch spaces. The mine plant had recently been damaged by an explosion. At time of sampling in 1909 the daily output averaged from 100 to 200 tons, but was being rapidly increased and was expected to reach eventually 500 tons or more. The coal was to be derived from both advance work and pillars. Thickness, fairly uniform (with exception of area where there are rolls), varying as mined from about 3′ 8″ to 4′ 8″; roof, shale of varying character; floor, hard clay."

Stuart Colliery Co. "Summerlee" Mine, Formerly "Parral Shaft"—No. 144 on Map II.

On head of Wolf Creek, at Summerlee (formerly Parral); **Sewell Coal**; elevation, 1345′ L.; section by author as published on page 203 of Volume II(A) by Dr. White in 1908; depth to Sewell Coal, 659′.

				Feet.	Inches.
1.	Sandstone				
2.	**Coal**, soft, bright	1′	3½″		
3.	**Coal**, harder, gray	1	8		
4.	**Coal**, soft, "mining"	1	1	4	0½
5.	Slate, black				

"Greatest rise, S. 40° E.; mine capacity, 100 tons; men employed 34; sample from Nos. 2, 3, and 4, the analysis of which was published under No. 6 on page 215 of Volume II(A) by Dr. White and republished by him under the same number on page 241 of Bulletin 2 of the Survey; general office of Company, Macdonald, W. Va.; authority for mine data, Fred Dixon and Lawrence Blenkinsopp, Superintendent."

Dr. White published the following remarks on pages 203-204 of Volume II(A) concerning this shaft:

"The Sewell Coal dips rapidly under a deep covering of higher measures as we pass northwestward from Thurmond, but as it maintains a valuable thickness for several miles in that direction, it has in recent years been extensively developed through several deep shafts sunk to the coal principally through a group of coal interests controlled by Mr. Samuel Dixon, the veteran coal operator of Macdonald, Fayette County.

"Among these shafts is the Parral (now Summerlee), owned and operated by the Stuart Colliery Co., situated about 7 miles northwest from Thurmond, at which a very disastrous explosion occurred in 1906 and many miners lost their lives. . . . .

"When this shaft was first sunk it struck the Sewell Coal horizon in the center of a wide 'roll' and the coal was completely absent where it should have been found. The shaft was continued on down to a depth of 690 feet, and from there a diamond drill hole was sunk to a still greater depth until a coal bed 3′ 4″ thick was finally encountered at about 870 feet below the top of the shaft. This coal was at first supposed to be the Sewell, which had taken a sudden 'dip', but an examination by the writer disclosed it to be the Beckley Coal, while the Sewell bed, over 200 feet higher, had been completely cut out with a 'roll.' The further deepening of the shaft was then abandoned, and an entry was driven through the solid rock at the proper horizon in the shaft to where the Sewell bed again made its appearance, only a short distance from the shaft."

The coal bed was also measured and sampled at one point on July 1, 1909, by P. M. Riefkin, at two points on July 1, 1909, by F. J. Simington, and at one point on August 28, 1909, by A. J. Hazlewood, of the U. S. Geological Survey, as given on page 949 of Bulletin 22 of the U. S. Bureau of Mines.

Section A (sample 7875) was cut from face of left heading, off main east entry, about 800 feet northeast of shaft; thickness of bed and of coal sampled, 4′ 5½″.

Section B (sample 7874) was cut from the face of right entry 3, about 2,600 feet northwest of shaft; thickness of bed and of coal sampled, 4′ 3½″.

Section C (sample 8084) was cut from the face of left west entry 2, about 1,800 feet southwest of shaft; thickness of bed and of coal sampled, 3′ 9″.

Section D (sample 8967) was cut from the face of left entry 1, on east side, about 850 feet northeast of shaft; thickness of bed and of coal sampled, 4′ 0½″.

A **composite sample** was made by mixing samples 7874, 7875, and 8084 for an ultimate analysis, the results of which are shown under laboratory **No. 8161.** The latter analysis, along with an air-dried calculation of the same, was published by Dr. White under No. 33 in Table No. 8 on page 245 of Bulletin 2 of the W. Va. Geological Survey.

These 5 analyses, as taken from page 241 of Bulletin 22 of the U. S. Bureau of Mines, together with the air-dried calculation of sample No. 8161 mentioned above, are given under **Mine No. 144** in Table 3 at the end of this Chapter.

"Notes.—The coal was undercut in the bed, and was shot down with a short-flame explosive. The daily output averaged about 300 tons. Thickness, nearly uniform, ranging as mined from about 3′ 8″ to 4′ 6″; roof, hard shale; floor, hard, black, smooth, shaly underclay."

Dunglen Coal Co. "Sewell Knob Mine"—No. 145 on Map II.

On Sewell Knob, 0.5 mile west of Stonecliff; **Sewell Coal**; elevation, 2060′ B.; section as obtained by author and published by Dr. White on page 201 of Volume II(A).

			Feet.	Inches.
1.	Sandstone			
2.	"Draw" slate		1	0
3.	Coal, soft, bright	3′ 4½″		
4.	Coal, soft, gray	1 0	4	4½
5.	Fire clay			

"Greatest rise, S. 37° E.; mine capacity, 250 tons; men employed, 69; sample from Nos. 3 and 4, the analysis of which was published under No. 4 in Table No. 2 on page 215 of Volume II(A) by Dr. White and republished by him under the same number on page 241 of Bulletin 2; coal shipped both east and west, principally for steam; office of the company, Dunglen, W. Va.; authority for mine data, Leo Shaffer, Superintendent."

The above-mentioned analysis is given under **Mine No. 145** in Table 1 at the end of this Chapter.

The bed was also measured and sampled at one point by H. M. Wolflin on June 18, 1909, and at two points by H. M. Wolflin, of the U. S. Geological Survey, on July 14, 1909, as given on pages 914-915 of Bulletin 22 of the U. S. Bureau of Mines.

Section A (sample 7994) was cut from room 1 off right entry 2, about 600 feet northwest of drift mouth; thickness of coal and of bed sampled, 4′ 6⅜″.

Section B (sample 8221) was cut from room 3 off left entry 5 off main entry 3, about 1,400 feet approximately N. 45° W. of drift mouth; thickness of bed and of coal sampled, 4′ 3¾″.

Section C (sample 8220) was cut from face of left 6 off main 4, about 800 feet approximately N. 45° W. of drift mouth; thickness of bed and of coal sampled, 4′ 4″.

A composite sample was made by mixing samples 7994, 8220 and 8221 for an ultimate analysis, the results of which are shown under laboratory **No. 8295.** The latter analysis was published by Dr. White, along with an air-dried calculation of the same, under No. 9 in Table No. 8 on page 245 of Bulletin 2 of the W. Va. Geological Survey.

These 4 analyses, taken from pages 225-6 of Bulletin 22 of the U. S. Bureau of Mines, together with the above-mentioned air dried calculation of No. 8295, are given under **Mine No. 145** in Table 3 at the end of this Chapter.

"Notes.—The coal was undercut in bottom of bed partly with chain machines, but principally by hand, and was shot down with black powder or a permissible explosive. Tipples at each end were connected by same gravity plane to bins loading into railroad cars at the bottom of the hill; the arrangement was such that the coal from the two beds might be mixed or not, as desired. There were no screens, and consequently the whole output was shipped as run-of-mine coal. The daily output averaged about 200 to 300 tons, the capacity being about 400 tons. The future output was to be derived from both advance work and pillars in the Sewell bed; the Fire Creek bed was as yet not well developed. Thickness, even, ranging as mined from 4′ 2″ to 4′ 8″; roof, sandstone, between which and the coal there is a weak, 'slippy' gray shale, the sandstone in places coming down on top of the coal."

Prudence Coal Co. "Jones Mine"—No. 146 on Map II.

On branch of Meadow Fork, ½ mile northeast of Sanger; **Sewell Coal**; elevation, 1711′ L.; section by Teets 100 feet under hill on main heading.

			Feet.	Inches.
Slate, sometimes sandstone				
Coal, sulphurous	0′	4″		
Coal, gas (slate floor)	4	2	4	6

"Sometimes there is a little bone at bottom."

Prudence Coal Co. "Lyman Mine"—No. 149 on Map II.

On branch of Meadow Fork, 0.6 mile southwest of Sanger; **Sewell Coal**; elevation, 1700′ B.; section by Teets at pit mouth.

			Feet.	Inches.
Coal, sulphurous (slate roof)	0′	4″		
Coal, block (slate floor)	4	5	4	9

Prudence Coal Co. "Blue Jay Mine"—No. 150 on Map II.

On head of branch of Meadow Fork, 0.9 mile southwest of Sanger; **Sewell Coal**; elevation, 1700′ B.; section by Teets at pit mouth.

			Feet.	Inches.
Coal, sulphurous (slate roof)	0′	4″		
Coal, block (slate floor)	4	4	4	8

Calvin Hurte Coal Opening—No. 473 on Map II.

On south bank of Meadow Fork, 0.2 mile southeast of Sanger; **Sewell Coal**; elevation, 1720′ B.; section by Teets.

			Feet.	Inches.
Coal, sulphurous (slate roof)	0′	4″		
Coal (slate floor)	4	4	4	8

Newlyn Coal Co. Coal Opening—No. 474 on Map II, on west hillside of Dunloup Creek, ¾ mile southwest of Thurmond, in **Sewell Coal,** at an elevation of 1815′ B., was examined by Teets, but thickness not given.

Meadow Fork Coal Co. "Meadow Fork Mine"—No. 147 on Map II.

On west hillside of Dunloup Creek, 1.4 miles due east of Prudence; **Sewell Coal**; elevation, 1775′ B., section by Teets measured 100 feet underground in main heading.

			Feet.	Inches.
Slate and sandstone				
Coal, sulphurous, 0′ 4″ to	0′	6″		
Coal, gas (slate floor)	4	6	5	0

"Sometimes 2 inches of bone at bottom of seam. Principal office, Newlyn, W. Va.; used for steam; shipped east and west; output, 100 tons daily; capacity 250 tons daily; number of men employed, 16 miners and 11 laborers; mule haulage and dinky. Has been running under this name 12 years or since organization; leased from McKell Estate; H. Meadows, Mine Foreman, authority for mine data."

The author also obtained the following data at this mine in 1907, as published by Dr. White on pages 201-202 of Volume II(A):

				Feet.	Inches.
1.	Sandstone				
2.	Draw slate			0	4
3.	**Coal**, soft, bright	2′	1″		
4.	**Coal**, splinty	0	4		
5.	**Coal**, soft, grayish	2	11	5	4
6.	Slate, dark				

"Greatest rise, S. 40° E.; butts, N. 50° E.; faces S. 40° E.; mine capacity, [illegible] tons; men employed, 25; sample from Nos. 3, 4, and 5, the analysis of which was published by Dr. White under No. 5 in Table No. 1, page 215 of Volume II(A) and republished by him under the same number on page 241 of Bulletin 2 of the Survey; coal shipped east and west for smithing and domestic uses; roof, bad; authority for mine data, Jas. H. Boyd, Secretary."

The above-mentioned analysis, made in the Survey laboratory, is given under **Mine No. 147** in Table 1 at the end of this Chapter.

DeWitt Fuel Co. Mine—No. 148 on Map II.

On north hillside of Dunloup Creek, 0.4 mile southeast of Prudence; **Sewell Coal**; elevation, 1780′ B.; section by Teets, measured 100 feet underground in main heading.

			Feet.	Inches.
Coal, sulphurous (slate roof)	0′	5″		
Coal, gas (slate floor)	4	7	5	0

"Sometimes a little streak of bone occurs in bottom of seam, 5″ to 7″ thick, just local. Mine opened in 1916; used for steam and domestic purposes; shipped east and west; daily capacity, 300 tons; daily output, 150 tons; number of men employed, 25 miners and 25 laborers; mule haulage; leased from McKell Estate; T. H. Snyder, General Manager, authority for data."

Prudence Coal Co. Coal Opening—No. 475 on Map II, on north hillside of Dunloup Creek, 0.2 mile east of Prudence; **Sewell Coal**; elevation, 1740′ B.; examined by Teets, represents entry driven out by Prudence Mine (No. 151 on Map II), but thickness not given.

Prudence Coal Co. "Prudence Mine"—No. 151 on Map II.

On east bank of Twomile Branch, north edge of Prudence; **Sewell Coal**; elevation, 1680′ B.; section by Teets measured 100 feet underground in main heading.

			Feet.	Inches.
Slate, draw			1	0
Coal, sulphurous	0′	6″		
Coal, gas (slate floor)	4	3	4	9

"Principal office, Macdonald, W. Va.; shipped east and west for steam purposes; daily capacity, 800 tons; daily output, 700 tons; number of men employed, 100 miners and 80 laborers; always operated under this name; electric haulage; John Whitehead, Superintendent, authority for data."

Messrs. Brady and Edmonds in 1902 also reported a thickness of 5′ 2″ when they sampled the coal for analysis, the latter being published by Dr. White under No. 28 on pages 658 and 660 of Volume II, as reported by Prof. Hite, and also republished by him under the same number on pages 212-213 of Volume II(A) and page 248 of Bulletin 2 of the Survey. This analysis is given under **Mine No. 151** in Table 1 at the end of this Chapter.

The coal bed was also measured and sampled at two points in this mine by F. J. Simington, on June 9, 1909, and at two points by H. M. Wolflin, of the U. S. Geological Survey, on July 12, 1909, as given on pages 940-1 of Bulletin 22 of the U. S. Bureau of Mines.

Section A (sample 7915) was cut from face of main entry, 1,200 feet east of drift mouth; thickness of bed and of coal sampled, 5′ 2″.

Section B (sample 7916) was cut from face of main air-course, 2,000 feet east of drift mouth; thickness of bed and of coal sampled, 5′ 4¾″.

Section C (sample 8218) was cut from face of left entry 2, off right entry 2, off "C" entry, about 1,400 feet approximately south from opening; thickness of bed and of coal sampled, 4′ 4⅜″.

Section D (sample 8219) was cut from pillar in room No. 4, off left entry 1, off right entry 1, off "B" main entry, about 2,600 feet approximately east of the opening.

A **composite sample** was made by mixing samples 7915, 7916, 8218, and 8219 for an ultimate analysis, the results of which are shown under laboratory **No. 8301**. The latter analysis, along with an air-dried calculation of the same, was published by Dr. White under No. 31 in Table No. 8 on page 245 of Bulletin 2 of the W. Va. Geological Survey.

These 5 analyses, as taken from page 237 of Bulletin 22 of the U. S. Bureau of Mines, together with the air-dried calculation of sample No. 8301 above mentioned, are given under **Mine No. 151** in Table 3 at the end of this Chapter.

"Notes.—The coal from this mine, like that from many others in this field, is soft and friable. Owing to light cover, and the consequent circulation of surface water, it is often 'rusty' in appearance, and has three vertical seams of clay; it was undercut in the bottom part of the bed by hand, and was shot down usually with black powder, occasionally with short-flame explosives. There were no screens, so that the entire output was shipped as run-of-mine coal. The daily output at time of sampling and measurement in 1909 averaged about 800 tons, 1,200 tons being a maximum day's run. The future output was to be derived from both advance work and pillars. Thickness, nearly even; ranging as mined, from about 4′ 2″ to 5′ 6″; roof, sandstone underlain for the most part with clay, which varies from soft and moist to hard, dry, and shaly; floor, shale with smooth surface, which in places softened and became mixed with the coal in loading; cover, for the most part, probably less than 100 feet thick."

Harvey Coal & Coke Co. "Harvey Mine"—No. 152 on Map II.

On Smith Branch of Dunloup Creek, ½ mile northwest of Harvey; **Sewell Coal**; elevation, 1620′ B.; section at mine entrance by Teets.

		Feet.	Inches.
Slate, draw		1	0
Coal, sulphurous	0′ 4″		
Coal, gas	4 6	4	10
Slate			

"Principal office, Macdonald; shipped east, west, and north for domestic and steam purposes; daily capacity, 1050 tons; daily output 900 tons; number of men employed, 120 miners and 85 laborers; 120 coke ovens, not running; coal leased from different parties; John Whitehead, Superintendent, authority for data."

Messrs. Brady and Edmonds reported a thickness of 5′ 5″ of coal at this mine when they visited it in 1902, as published by Dr. White under No. 29, along with the analysis of a sample collected by them, on pages 658 and 660 of Volume II. The analysis was also republished by him under the same number on pages 212-213 of Volume II(A) and page 248 of Bulletin 2 of the Survey. This analysis is given under **Mine No. 152** in Table 1 at the end of this Chapter.

Messrs. Brady and Edmonds also collected a sample of the coke made at this mine, the analysis of which by Prof. Hite was published by Dr. White under No. 3 on pages 663-4 of Volume II and republished by him under the same number on page 214 of Volume II(A) and page 249 of Bulletin 2. This analysis is given under **Mine No. 152** in Table 2 at the end of this Chapter.

The coal bed was also measured and sampled at two points in this mine on July 10, 1909, and at one point on June 30, 1909, by F. J. Simington, of the U. S. Geological Survey, as given on page 924 of Bulletin 22 of the U. S. Bureau of Mines.

Section A (sample 7920) was cut from room 14 off right entry 19 in No. 1 district, about 9,000 feet northeast of drift mouth; thickness of bed and of coal sampled, 4′ 1¼″.

Section B (sample 7921) was cut from room 1 off right entry 10 in No. 2 district, about 7,000 feet north of drift month; thickness of bed and of coal sampled, 3′ 11″.

Section C (sample 8085) was cut from room 17 at face of right entry 1 off left entry 4, 8,000 feet south of drift mouth; thickness of bed and of coal sampled, 5′ 0″.

A **composite sample** was made by mixing samples 7920, 7921, and 8085 for an ultimate analysis, the results of which are shown under laboratory **No. 8164.** The latter analysis, along with an air-dried calculation of the same, was published by Dr. White under No. 43 in Table No. 8 on page 245 of Bulletin 2 of the W. Va. Geological Survey.

These 4 analyses, as taken from pages 230 and 231 of Bulletin 22 of the U. S. Bureau of Mines, together with the air-dried calculation of sample No. 8164 mentioned above, are given under **Mine No. 152** in Table 3 at the end of this Chapter.

"Notes.—The coal at this mine was undercut by hand and with chain machines, and was shot down with black powder. The tipple was equipped with bar screens with 5-inch and 1¾-inch openings. The daily output at the time of sampling averaged about 650 tons, 1,000 tons being the capacity of the mine. Thickness, nearly uniform, ranging as mined from 3′ 10″ to 5′ 1″; roof sandstone, between which and the coal there is sometimes a shale; floor, soft shaly underclay."

Star Coal & Coke Co. "Star Mine"—No. 153 on Map II.

On west hillside of Dunloup Creek, at Redstar; **Sewell Coal**; elevation, 1645′ B.; section by Teets measured at drift mouth.

			Feet.	Inches.
Slate, generally, sometimes sandstone..........				
Coal	4′	5		
Slate	0	2		
Coal	1	0	5	7

"This parting comes and goes—gets to be 12″ sometimes, while at times there is no parting. Principal office, Redstar, W. Va.; shipped east and west for steam and domestic purposes; daily capacity, 1000 tons; daily output, 800 tons; number of men employed, 175; owned by Jones Brothers and leased by Company from them; mine has always run under this name; Geo. W. Jones, General Manager, authority for data."

Messrs. Brady and Edmonds reported a thickness of 5′ 1″ of coal when they visited this mine in 1902, as given under No. 30 by Dr. White on pages 658 and 660 of Volume II along with the analysis of a sample collected by them. This analysis was republished by Dr. White under the same number on pages 212-213 of Volume II(A) and page 248 in Bulletin 2 of the Survey. It is given under **Mine No. 153** in Table 1 at the end of this Chapter.

The coal bed was also measured and sampled at two points in this mine by K. M. Way, of the U. S. Geological Survey, on September 20, 1907, and at two points on June 19, 1909, by J. J. Rutledge, and at two points on August 4, 1909, by A. J. Hazlewood, of the same Survey, as given on pages 942-3 of Bulletin 22 of the U. S. Bureau of Mines.

Section A (sample 5396) was measured in room 16, on right entry 18, 7,600 feet southwest of the drift mouth; thickness of bed, 3′ 9⅛″; thickness of coal sampled, 3′ 7⅛″.

Section B (sample 5397) was measured in room 12, on left entry 13, 6,700 feet southwest of the drift mouth; thickness of bed and of coal sampled, 5′ 3¾″.

Section A (sample 7988) was cut from right entry 21, between rooms 15 and 16, about 9,000 feet northeast of drift mouth; thickness of bed, 3′ 8¾″; thickness of coal sampled, 3′ 7¾″.

Section B (sample 7991) was cut from room 15, off left entry 16, about 7,500 feet southwest of drift mouth; thickness of bed, 4′ 3½″; thickness of coal sampled, 4′ 1½″.

Section C (sample 8656) was cut from face of room 22, off right entry 18; thickness of bed and of coal sampled, 5′ 2½″.

Section D (sample 8657) was cut from face of main heading, 10,800 feet northwest of drift mouth; thickness of bed and of coal sampled, 4′ 5″.

A **composite sample** was made by mixing samples Nos. 7988 and 7991 for an ultimate analysis, the results of which are shown under laboratory **No. 8296.** The latter analysis, along with an air-dried calculation of the same, was published by Dr. White under No. 23 in Table No. 8 on page 244 of Bulletin 2 of the W. Va. Geological Survey.

Two cars of run-of-mine coal from this mine were shipped to the U. S. Fuel-Testing Plant, at Norfolk, Virginia, for steaming and briquetting tests. The coal was loaded under the supervision of Inspector K. M. Way, of the U. S. Geological Survey, one car being exposed to the weather for 20 days, the other for 41 days, before arriving at the testing plant. The analyses of car samples are shown under laboratory **Nos. 5489 and 5574,** being taken from pages 13 and 14 of Bulletin 362 of the U. S. Geological Survey, where they were published under "Jamestown No. 6," the mine samples Nos. 5396 and 5397 being also published on the same pages cited.

These 9 analyses, as taken from pages 237 and 238 of Bulletin 22 of the U. S. Bureau of Mines, together with the air-dried calculation of sample No. 8296, are given under **Mine No. 153** in Table 3 at the end of this Chapter.

"Notes.—The coal was undercut in the bed by hand and with chain machines, and was shot down with black powder. The tipple was equipped with bar screens (14 feet by 6 feet), with 3-inch and 1-inch openings. The coal was picked on the car by four trimmers. The estimated average daily output at time of sampling in 1909 was 950 tons; this was practically a maximum day's run. The future tonnage was to be derived almost entirely from pillars. Thickness, fairly uniform, ranging as mined from 4½ to 5½ feet; roof, hard gray shale (good); floor, gray shale underclay, with smooth surface."

The following data are taken from pages 20-21 of Bulletin 385 of the U. S. Geological Survey:

"Jamestown No. 6.

"The briquets made from this coal were excellent in their physical characteristics and when warm had smooth surfaces, sharp edges, and were sufficiently strong to be loaded on cars direct from the machine. When cold these briquets were hard and firm but somewhat brittle on the edges."

Briquet Tests.

Test No.	260
Size of coal as used:	
Over 1-4 inch ... per cent.	0.8
1-10 to 1-4 inch ... per cent.	3.1
1-20 to 1-10 inch ... per cent.	11.2
1-40 to 1-20 inch ... per cent.	26.3
Through 1-40 inch ... per cent.	58.4
Details of manufacture:	
Machine used	Eng.
Briquetting temperature ... °F.	203
Binder:	
Kind	W. G. P.
Laboratory No. (see p. 8, Bull. 385)	5563
Amount ... per cent.	6
Weight of—	
Fuel briquetted ... pounds	41,400
Briquets, average ... pounds	3.52
Heat value per pound:	
Coal as received ... B. T. U.	14,783
Briquets ... B. T. U.	14,715
Binder ... B. T. U.	16,718
Moisture in briquets ... per cent.	[illegible]
Drum test (1-inch screen):	
Held ... per cent.	80.2
Passed ... per cent.	19.8
Shatter test (1-inch screen):	
Held ... per cent.	77.4
Passed ... per cent.	22.6
[illegible] ... per cent.	[illegible]
Weathering test:	
Days exposed ... days	135
Condition	A
Water immersion:	
Time immersed ... days	[illegible]
Water absorbed ... per cent.	[illegible]
[illegible] ... per cent.	[illegible]
Specific gravity of briquets	1.117

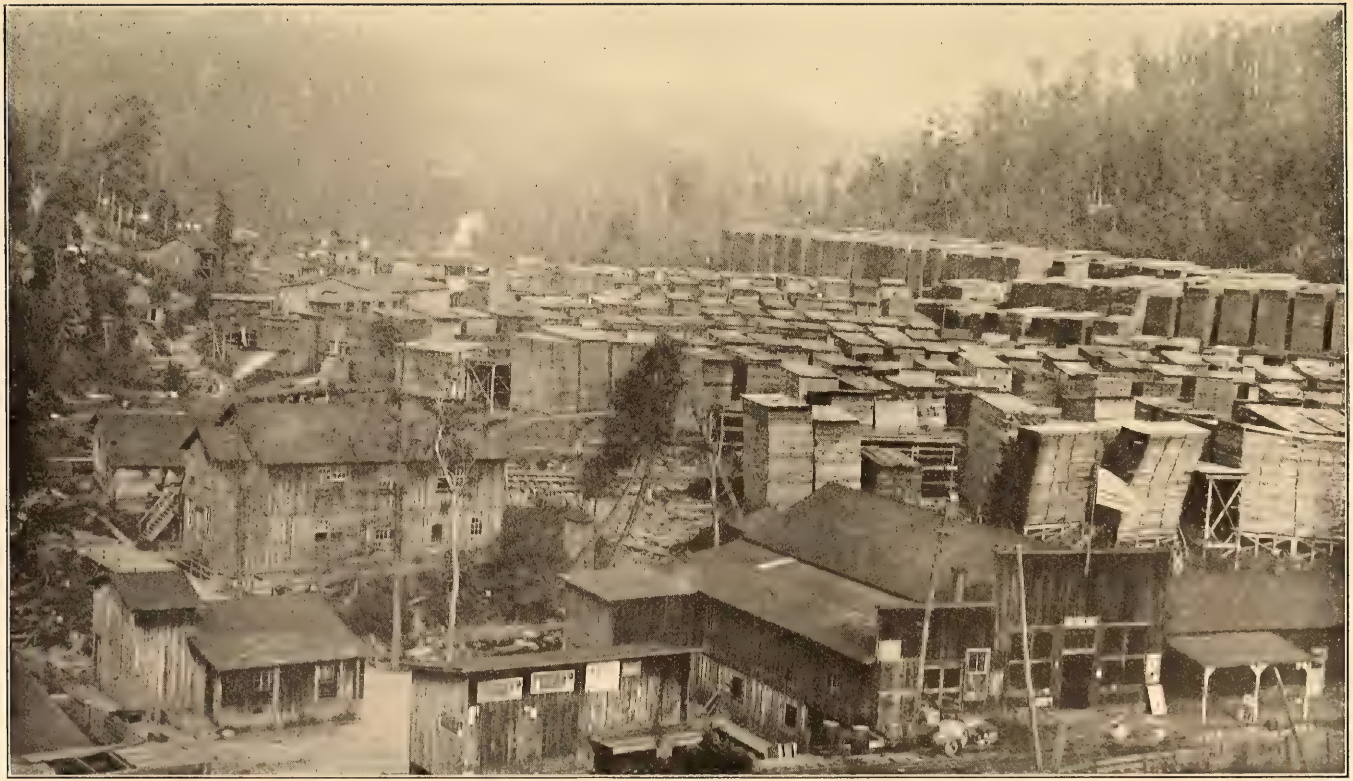


PLATE XXIV.—View showing lumber yard and company store at Landisburg, typical of the lumber industry in West Virginia, and topography of the New River Group.

Chemical Analyses of Briquets, Test No. 260

Laboratory No. 5558.

Proximate	Per cent.	**Ultimate**	Per cent.
Moisture	2.15	Hydrogen	5.09
Volatile Matter	21.87	Carbon	83.37
Fixed Carbon	71.13	Nitrogen	1.53
Ash	4.85	Oxygen	4.35
Sulphur	0.81		

Extraction Analyses.

	Pitch.	Fuel.	Briquets.
		J-6.	Test 260.
Laboratory No.	5563	5489	5558
Air-drying loss, per cent.	0	1.50	1.50
Extracted by CS_2:			
Air dried, per cent.	90.33	.364	5.40
As received, per cent.	90.33	.359	5.32
Pitch in briquet as received, per cent.	....	....	5.51

Laura Mining Co. "Laura Mine"—No. 154 on Map II.

On west hillside of Dunloup Creek, ⅛ mile south of Mine No. 153; **Sewell Coal**; elevation, 1635′ B.; section and data by Teets at mine mouth.

	Feet.	Inches.
Slate and sandstone roof, sometimes one, then the other		
Coal (slate roof)	5	6

"There is a streak of bone at times from 0″ to 8″. Principal office, Redstar; used for steam and domestic purposes; shipped east; daily capacity, 30 tons; daily output, 30 tons; number of men employed, 6 miners and 2 laborers; leased from McKell Coal & Coke Co.; always run under this name; have been running 15 years; just mining pillars; about mined out; A. L. Nelson, Superintendent, authority for mine data."

The coal bed was also measured and sampled at three points by H. M. Wolflin, of the U. S. Geological Survey, on June 22, 1909, as given on page 941 of Bulletin 22 of the U. S. Bureau of Mines.

Section A (sample 8001) was cut from face of left air-course 4, about 2,700 feet east of drift mouth; the sample was very wet; thickness of bed, 5′ 8½″; thickness of coal sampled, 5′ 4″.

Section B (sample 8002) was cut from room 7 on left entry 5, about 2,800 feet southeast of drift mouth; thickness of bed and of coal sampled, 5′ 6¼″.

Section C (sample 8003) was cut from pillar 2 on left entry 2, about 1,800 feet southeast of drift mouth; thickness of bed and of coal sampled, 4′ 11¾″.

A **composite sample** was made by mixing both face and pillar samples 8001, 8002, and 8003. The results of an ultimate analysis of this sample are shown under laboratory **No. 8118.** The latter analysis, along with an air-dried calculation of the same, was published by Dr. White under No. 4 in Table No. 8 on page 243 of Bulletin 2 of the W. Va. Geological Survey.

These 4 analyses, as taken from page 237 of Bulletin 22 of the U. S. Bureau of Mines, together with the air-dried calculation of sample No. 8118 mentioned above, are given under **Mine No. 154** in Table 3 at the end of this Chapter.

"Notes.—The coal at this mine was undercut by hand, and was shot down with black powder or a short-flame explosive. The tipple had bar screens; these were not in use at time of sampling, all coal being shipped in run-of-mine form. The estimated daily output was about 350 tons, the capacity of the mine being approximately 550 tons. The future output was to be derived from both advance work and pillars. Thickness, closely uniform, ranging as mined from about 4′ 10″ to 5′ 8″; roof, strongly bedded sandstone, locally underlain with a weak clay shale; floor, hard, smooth, shaly underclay."

New River Co. "Collins Mine"—No. 155 on Map II.

On east hillside of Dunloup Creek, at Glen Jean; **Sewell Coal**; elevation, 1635′ B.; section and data by Teets.

		Feet.	Inches.
Draw slate (sometimes sandstone) roof		0	10
Coal, sulphurous	0′ 4″		
Coal, gas, soft (slate floor)	4 4	4	8

"This mine was originally operated by the Collins Colliery Company, opened about 20 years ago; was taken over by present owners in 1908; lease coal from McKell Coal Co.; used for domestic and steam purposes; shipped east and west; daily capacity, 500 tons; daily output, 450 to 500 tons; number of men employed, 75 miners and 30 laborers; 100 beehive coke ovens, the stone for the construction of which was obtained from the Guyandot Sandstone directly overlying the Sewell Coal; Ed. Malone, Superintendent, authority for mine data."

Messrs. Brady and Edmonds reported a thickness of 5′ 6″ of coal when they visited the mine in 1902 for sampling, as given by Dr. White under No. 31 on pages 658 and 660 of Volume II along with the analysis as made by Prof. Hite. This analysis was also republished by Dr. White under the same number on pages 212-213 of Volume II(A) and page 248 of Bulletin 2 of the Survey. It is given under **Mine No. 155** in Table 1 at the end of this Chapter.

A sample of the coke manufactured at this mine was also collected by Messrs. Brady and Edmonds, the analysis by Prof. Hite being published under No. 4 on pages 663-4 of Volume II and republished under the same number on page 214 of Volume II(A) and page 249 of Bulletin 2 of the Survey. This coke analysis is given under **Mine No. 155** in Table 2 at the end of this Chapter.

The coal bed was also measured and sampled at four points in this mine by F. J. Simington, of the U. S. Geological Survey, on July 9, 1909, and at two points by A. J. Hazlewood, of the same Survey, on August 4, 1909, as given on pages 922-3 of Bulletin 22 of the U. S. Bureau of Mines.

Section A (sample 7923) was cut from room 14, off left entry 12, 7,000 feet north of drift mouth; thickness of bed and of coal sampled, 4′ 5″.

Section B (sample 7922) was cut from room 2, off right entry 5, off main entry 21, 7,000 feet from drift mouth; thickness of bed and of coal sampled, 5′ 10½″.

Section C (sample 8124) was cut from pillar 18, off right entry 9, off main entry 1, 3,300 feet south of drift mouth; thickness of bed and of coal sampled, 5′ 2⅞″.

Section D (sample 8125) was cut from room 2, off left entry 2, off entry 21, 4,000 feet southeast of drift mouth; thickness of bed and of coal sampled, 3′ 8¾″.

Section E (sample 8650) was cut from face of right entry 6, off entry 21, 4,800 feet southeast of drift mouth; thickness of bed and of coal sampled, 5′ 1″.

Section F (sample 8651) was cut from near face of left entry 9, off entry 21, 4,000 feet east of drift mouth; thickness of bed, 5′ 8½″; thickness of coal sampled, 5′ 2½″.

A **composite sample** was made by mixing samples 7922, 7923, 8124, and 8125 for an ultimate analysis, the results of which are shown under laboratory **No. 8192.**

These 7 analyses, as taken from pages 229 and 230 of Bulletin 22 of the U. S. Bureau of Mines, are given under **Mine No. 155** in Table 3 at the end of this Chapter.

"Notes.—The coal at this mine was undercut in the lower part of the bed by chain machines. The tipple was equipped with screens to give three sizes of coal: Lump, over 5-inch screen; egg, over 2-inch; and slack through 2-inch. The screenings were coked, the plant having 90 ovens. The average daily output in July, 1909, was 1,100 tons. The thickness of the coal ranges from 4¼ to 5¼ feet. The roof is a hard shale. The floor is a soft shaly underclay."

Nichol Colliery Co. "Nichol Mine"—No. 155A on Map II.

On west hillside of Dunloup Creek, 0.4 mile southwest of Glen Jean; **Sewell Coal**; slope mine, 30 feet in depth; elevation, 1612′ L.; section by author as published by Dr. White on page 205 of Volume II(A) in 1908.

				Feet.	Inches.
1.	Slate, fair roof				
2.	**Coal**, soft, bright	1′	8″		
3.	**Coal**, harder, grayish	2	2		
4.	**Coal**, soft	1	1		
5.	Slate, black, 6″ to	0	0⅛		
6.	**Coal**, soft (fire clay floor)	0	8	5	7⅛

"Greatest rise, S. 55° E,; butts N. 20° W.; faces S. 70° W.; mine capacity, 250 tons; men employed, 40; sample from Nos. 2, 3, 4, and 6, the analysis of which was published by Dr. White under No. 10 on page 215 of Volume II(A) and republished by him under the same number on page 241 of Bulletin 2 of the Survey; coal all shipped to tidewater for steam purposes; rather harder and makes more lump than most of the Sewell Coal mines; authority for mine data, Jas. Martin, Mine Foreman."

The analysis mentioned above is given under **Mine No. 155A in** Table 1 at the end of this Chapter.

The bed was also measured and sampled at three points on June 21-24, 1909, by H. M. Wolflin, and at two points on July 31, 1909, by A. J. Hazlewood, of the U. S. Geological Survey, as given on pages 923-4 of Bulletin 22 of the U. S. Bureau of Mines.

Section A (sample 8000) was cut from face of left entry 4, about 2,800 feet northwest of slope; thickness of bed and of coal sampled, 5′ 4¾″.

Section B (sample 8004) was cut from face of right entry 3, about 2,300 feet north of slope; thickness of bed and of coal sampled, 4′ 11¼″.

Section C (sample 8022) was cut from face of main entry, about 2,750 feet approximately northwest of slope; thickness of bed, 4′ 10½″; thickness of coal sampled, 4′ 8½″.

Section D (sample 8595) was cut from face of left entry 5, about 2,500 feet from slope; thickness of bed and of coal sampled, 4′ 5½″.

Section E (sample 8596) was cut from face of right entry 5, about 2,500 feet from slope; thickness of bed and of coal sampled, 4′ 8″.

A composite sample was made by mixing samples 8000, 8004, and 8022 for an ultimate analysis, the results of which are shown under laboratory No. 8110.

These 6 analyses, as taken from page 230 of Bulletin 22 of the U. S. Bureau of Mines, are given under **Mine No. 155A** in Table 3 at the end of this Chapter.

"Notes.—The coal was undercut in the bed with chain machines and by hand, and was shot down with a short-flame explosive. The tipple contained bar screens with 1½-inch and 5-inch openings. The coal was picked on the car. The daily output averaged about 600 tons, and 900 tons was the capacity of the mine. The future output for some time to come was to be derived mainly from advance work. Thickness, nearly uniform, ranging as mined from about 4½ feet to 5½ feet; roof, sandstone, underlain for the most part with hard blue shale; floor, hard blue shaly underclay."

White Oak Fuel Co. "Wingrove Shaft"—No. 156 on Map II.

On west hillside of Whiteoak Creek, at Wingrove; **Sewell Coal;** elevation, top of shaft, 1715′ B.; elevation of coal, 1485′ B.

				Feet.	Inches.
1.	Sandstone				
2.	Draw slate			0	2
3.	**Coal**, soft	0′	10″		
4.	Slate, black, ½″ to	0	0		
5.	**Coal**, soft "mining"	0	6		
6.	**Coal**, harder, gray	2	0		
7.	Slate, black, ½″ to	0	0		
8.	**Coal**, soft (fire clay floor)	0	8	4	0

"Greatest rise, S. 40° E.; capacity of mine, 500 tons; men employed, 133; sample from Nos. 3, 5, 6, and 8, the analysis of which was published by Dr. White under No. 9 on page 215 of Volume II(A) and republished by him under the same number on page 241 of Bulletin 2 of the Survey; coal shipped both east and west for steam and domestic use; authority for mine data, J. W. Wilson, Assistant Superintendent."

The above data were secured at this mine in 1907 by the author and the analysis mentioned therein is given under **Mine No. 156** in Table 1 at the end of this Chapter.

The bed was also measured and sampled at two points on June 8, 1909, and at one point on July 7, 1909, by F. J. Simington, of the U. S. Geological Survey, and at one point on July 31, 1909, by A. J. Hazlewood, of the same Survey, as given on page 945 of Bulletin 22 of the U. S. Bureau of Mines.

Section A (sample 7906) was cut from face of right entry 5, about 2,500 feet northeast of shaft; thickness of bed and of coal sampled, 5′ 4″.

Section B (sample 7907) was cut from face of left entry 4, about 2,500 feet northwest of shaft; thickness of bed and of coal sampled, 5′ 4¼″.

Section C (sample 8126) was cut from pillar on main west entry, about 2,600 feet west of shaft; thickness of bed and of coal sampled, 5′ 0″.

Section D (sample 8597) was cut from face of right entry 3, off main northwest entry, about 2,000 feet from shaft; thickness of bed and of coal sampled, 4′ 10″.

A **composite sample** was made by mixing samples 7906, 7907, and 8126 for an ultimate analysis, the results of which are shown under laboratory **No. 8183.** The latter analysis, along with an air-dried calculation of the same, was published by Dr. White under No. 16 in Table No. 8 on page 244 of Bulletin 2 of the W. Va. Geological Survey.

The above 5 analyses, as taken from page 239 of Bulletin 22 of the U. S. Bureau of Mines, together with the air-dried calculation above mentioned, are given under **Mine No. 156** in Table 3 at the end of this Chapter.

"Notes.—The coal was mined with chain machines and punching machines in the bottom part of the bed, and was shot down with a short-flame explosive. The tipple had fixed diamond-bar screens of 2-inch and 5-inch openings. Three sizes of coal were prepared and shipped; lump, over 5-inch openings; egg, over 2-inch openings, and slack, under 2-inch openings. The daily output at time of sampling in 1909 averaged about 400 tons, and 1,000 tons was the capacity of the mine. The future output was to be derived from both advance work and pillars. Thickness, nearly uniform, ranging as mined from 4′ 10″ to 5′ 5″; roof, gray shale, locally indurated."

New River Co. "Whipple Shaft"—No. 157 on Map II.

On head of Whiteoak Creek, 0.8 mile N. 5° E. of Whipple Junction; **Sewell Coal**; depth of shaft, 430 feet; elevation of coal, 1365′ B. (U. S. B. M., Bull. 22, p. 957, gives depth of shaft as 456 feet). **Section B** (sample 7890) by F. J. Simington of the U. S. Geological Survey as published on page 957 of Bulletin 22 of the U. S. Bureau of Mines.

				Feet.	Inches.
Coal	2′	0 ″			
Hard gray coal	1	0¼			
Mother coal	0	0¾			
Coal	1	11	...	5	0

This mine was formerly owned by the White Oak Fuel Company.

The bed was also measured and sampled at one other point on June 5, 1909, by Mr. Simington, and on July 6, 1909, and at one point on August 2, 1909, by A. J. Hazlewood, of the U. S. Geological Survey, as given on page 957 of Bulletin 22 of the U. S. Bureau of Mines.

Section A (sample 7889) was cut from heading 1 in rock heading district, about 4,000 feet north of shaft; thickness of bed and of coal sampled, 4′ 4¼″.

Section B (sample 7890) given above, was cut from room 14, off entry 16, 3,000 feet west of shaft; thickness of bed sampled, 5′ 0″.

Section C (sample 8098) was cut from rib near face of right entry 3, off main dip entry; thickness of bed and of coal sampled, 4′ 2″.

Section D (sample 8599) was cut from face of left entry 1, off Harvey's entry; thickness of bed and of coal sampled, 4′ 10½″.

A **composite sample** was made by mixing samples 7889, 7890, and 8098 for an ultimate analysis, the results of which are shown under laboratory **No. 8157**. The latter analysis, along with an air-dried calculation of the same, was published by Dr. White under No. 15 in Table No. 8 on page 244 of Bulletin 2 of the W. Va. Geological Survey.

The analyses of the 5 samples mentioned above, as taken from pages 244 and 245 of Bulletin 22 of the U. S. Bureau of Mines, together with the air-dried calculation above noted, are given under **Mine No. 157** in Table 3 at the end of this Chapter.

"Notes.—The coal was undercut in the bed by punching machines and chain machines, and was shot down with a short-flame explosive. The tipple had shaking screens. Three sizes of coal were prepared and shipped: lump, over 4-inch openings; egg, over 1¾-inch openings, and slack, under 1¾-inch openings. The daily average output at time of sampling in 1909 was about 600 tons, and 1,000 tons was approximately the capacity of the mine. The future output was to be derived from both advance work and pillars. Thickness, fairly uniform, ranging as mined from about 4′ 1″ to about 5′ 1″; roof, sandstone, underlain for the most part with a hard shale, floor, hard, smooth, shaly underclay."

New River Co. (Formerly White Oak Fuel Co.) "Carlisle Shaft" (Abandoned) Mine—No. 158 on Map II.

On head of Whiteoak Creek, at Carlisle; **Sewell Coal**; depth of shaft, 440′; elevation of coal, 1350′ B.; examined by author.

(U. S. B. M. Bull. 22, p. 910, gives depth of shaft as 475′).

	Feet.	Inches.
Coal	4	0

This mine was abandoned during 1916 and all boilers removed, the coal now being taken out from Oakwood Shaft (Mine No. 159).

The bed was also measured and sampled at two points on June 3, 1909, and at one point on July 3, 1909, by F. J. Simington, and at two points on August 6, 1909, by A. J. Hazlewood, of the U. S. Geological Survey, as given on page 910 of Bulletin 22 of the U. S. Bureau of Mines.

Section A (sample 7880) was cut from left airway 1, off main entry, about 3,000 northwest of shaft; thickness of bed and of coal sampled, 4′ 8″.

Section B (sample 7881) was cut from right entry 2, off left entry 2, about 2,000 feet south of shaft; thickness of bed, 4′ 3¼″; thickness of coal sampled, 4′ 0¼″.

Section C (sample 8080) was cut from rib near face of right entry 6, about 2,800 feet south of shaft; thickness of bed, 4′ 0½″; thickness of coal sampled, 3′ 7½″.

Section D (sample 8702) was cut from face of left entry 1, off northwest entry 1, about 2,500 feet from shaft; thickness of bed and of coal sampled, 5′ 0¾″.

Section E (sample 8703) was cut from face of right entry 3, about 3,700 feet southwest of shaft; thickness of bed and of coal sampled, 3′ 5½″.

A **composite sample** was made by mixing samples 7880, 7881, and 8080 for an ultimate analysis, the results of which are shown under laboratory **No. 8166.**

These 6 analyses, as taken from pages 223 and 224 of Bulletin 22 of the U. S. Bureau of Mines, together with an air-dried calculation of the analysis of sample No. 8166 as published by Dr. White under No. 7 in Table No. 8 on page 244 of Bulletin 2 of the W. Va. Geological Survey, are given under **Mine No. 158** in Table 3 at the end of this Chapter.

"Notes.—Three sizes of coal were prepared at this mine: Lump, over 5-inch openings; egg, over 2-inch openings, and slack, under 2 inches in diameter. The lump and egg were mixed and shipped as one product. The mining was done in the bed entirely by hand, and the coal was shot down with short-flame explosives. The coal was picked on the car by two trimmers. The daily output in 1909 averaged 350 tons, and 700 tons was approximately the capacity of the mine. Thickness not very uniform, ranging as mined from 3′ 5″ to 5′ 1″; main roof, sandstone underlain with shale. Floor, shaly underclay of variable hardness."

New River Co. (Formerly White Oak Fuel Co.) "Oakwood Shaft"—No. 159 on Map II.

On head of Whiteoak Creek, 0.3 mile northwest of Carlisle; **Sewell Coal**; elevation, 1347′ B.; depth of shaft to bottom of Sewell Coal, 478 feet. (U. S. Bureau of Mines gives depth of shaft as 433 feet).

				Feet.	Inches.
1.	Slate, good roof				
2.	"Draw" slate			0	2
3.	**Coal**, soft, bright	1′	2″		
4.	**Coal**, harder	0	9½		
5.	**Coal**, harder, grayish	0	1½		
6.	**Coal**, soft, bright	2	5	4	6
7.	Fire clay				

"Greatest rise, S. 40° E.; mine capacity, 400 tons; men employed, 90; sample from Nos. 3, 4, 5, and 6, the analysis of which was published by Dr. White under No. 8 on page 215 of Volume II(A) and republished by him under the same number on page 241 of Bulletin 2 of the W. Va. Geological Survey; mine now connected underground with the Carlisle Shaft (Mine No. 158 on Map II) of the same company, the latter being located 3,000 feet southeast of the Oakwood Shaft; coal shipped mostly east for steam and domestic uses; authority for data, J. N. Schweitzer, Superintendent. Charles Thomas, Assistant Superintendent, authority for depth of shaft. Shaft starts near the top of the heavy Upper Nuttall? Sandstone.

"At bottom of this shaft the coal is only a streak for about 200 feet both north and east, the 'roll' disappearing west. It also extends to the south for about 150 feet when the coal becomes 'cannelly.'"

The above section and mine data were collected by the author in 1907 as published by Dr. White on pages 204-5 of Volume II(A) of the Survey. The analysis of the sample collected by the writer, as reported by Prof. Hite, is given under **Mine No. 159** in Table 1 at the end of this Chapter.

The bed was also measured and sampled at two points by F. J. Simington on June 2, 1909, and at one point by A. J. Hazlewood on July 28, 1909, both of the U. S. Geological Survey, as given on page 911 of Bulletin 22 of the U. S. Bureau of Mines.

Section A (sample 7876) was cut from face of left entry 1, off main entry, about 3,000 feet northeast of shaft. Thickness of bed and of coal sampled, 4′ 10½″.

Section B (sample 7877) was cut from room 20 at face of right entry 1, about 4,000 feet north of shaft; thickness of bed and of coal sampled, 4′ 6½″.

Section C (sample 8171) was cut from room 4 off right entry 2, about 2,000 feet from shaft; thickness of bed and of coal sampled, 3′ 9½″.

Section D (sample 8606) was cut from room 4 off right entry 2, about 3,500 feet from shaft; thickness of bed, 3′ 8⅛″; thickness of coal sampled, 3′ 6⅛″.

A composite sample was made by mixing samples 7876 and 7877. The results of an ultimate analysis of this sample are shown under laboratory **No. 8251.**

These 5 analyses, as taken from page 224 of Bulletin 22 of the U. S. Bureau of Mines, are given under **Mine No. 159** in Table 3 at the end of this Chapter.

"Notes.—The coal was mined by hand in the rooms and by punching machines in the entries. The tipple at the time of inspection in 1909 was equipped with screens of the fixed diamond-bar pattern. Three sizes were made and shipped from this mine: Lump, over 5-inch openings; egg, over 2-inch openings, and slack. The coal was picked on the car by two trimmers. The daily output averaged about 700 tons. It was derived almost entirely from advance work. Thickness, fairly uniform, ranging as mined from about 3′ 6″ to about 5 feet; roof, shale; floor, shale, sometimes soft. Cover, for the most part, more than 500 feet."

New River Co. (Formerly White Oak Fuel Co.)
"Scarbro" Shaft—No. 160 on Map II.

On branch of Whiteoak Creek, ½ mile S. 50° W. of Whipple Junction; **Sewell Coal**; elevation, 1350′ B.; depth of shaft, 430 feet. (U. S. Bureau of Mines Bull. 22, p. 944, gives depth of shaft as 400 feet); correlation verified by author.

				Feet.	Inches.
Coal	2′	1 ″			
Hard gray coal	0	11			
Coal	1	4¼	...	4	4¼

The bed was measured and sampled at two points on June 7, 1909, and at one point on July 7, 1909, by F. J. Simington, of the U. S. Geological Survey, as given on pages 944-5 of Bulletin 22 of the U. S. Bureau of Mines.

Section A (sample 7895) was cut from face of main southwest entry, about 4,500 feet southwest of shaft; thickness of bed, 5′ 6½″; thickness of coal sampled, 4′ 6½″.

Section B (sample 7896) given above was cut from right entry 3, off main north entry, about 3,500 feet northeast of shaft.

Section C (sample 8128) was cut from pillar No. 2, off right entry 3 off main northeast entry, about 4,000 feet east of shaft; thickness of bed, 5′ 3″; thickness of coal sampled, 3′ 7″.

A **composite sample** was made by mixing samples 7895, 7896, and 8128 for an ultimate analysis, the results of which are shown under laboratory **No. 8187.** The latter analysis, along with an air-dried calculation of the same was published by Dr. White under No. 29 in Table No. 8 on page 245 of Bulletin 2 of W. Va. Geological Survey.

These 4 analyses, as taken from page 239 of Bulletin 22 of the U. S. Bureau of Mines, together with the above-mentioned air-dried calculation of sample No. 8187, are given under **Mine No. 160** in Table 3 at the end of this Chapter.

"Notes.—The coal was undercut in bottom part of bed to some extent by machines, but chiefly by hand and was shot down with a short-flame explosive. Three sizes of coal were prepared: Lump, over 5-inch screens; egg, over 2-inch screens, and slack; only two sizes, however, were being shipped at time of sampling, the lump and egg being mixed and shipped as one product. The screens were of the fixed diamond-bar pattern. The daily output in 1909 averaged about 650 tons, and 900 tons was a maximum day's run. The output in the immediate future was to be derived almost entirely from pillars. Thickness, fairly uniform, ranging as mined from about 4′ 2″ to 5′ 8″; roof, strongly bedded sandstone, sometimes underlain with shale; floor, hard shale."

New River Collieries Co. (Formerly Sun Coal & Coke Co.) "Sun No. 1" Mine—No. 161 on Map II.

On north bank of Bend Branch of Dunloup Creek, east edge of Sun; **Sewell Coal**; elevation, 1550′ L.; elevation of surface, 1660′ L. Shaft 110′ deep; section and data by Teets.

			Feet.	Inches.
Slate, draw, (sandstone roof)			0	8
Coal, gas	2′	7″		
Bone	0	6		
Coal (slate floor)	1	11	5	0

Mine data, Sun Nos. 1 and 2 (Nos. 161 and 162, respectively, on Map II): 25 per cent. of coal is cut by mining machines; electric and mule haulage; used for steam and domestic purposes; shipped east and west; output, 1500 tons daily; capacity, 2000 tons daily; number of men employed, 160 miners and 130 laborers; mine opened in 1893 by Sun Coal & Coke Company; later operated by New River Smokeless Company in 1900; and by present owners since 1907.

Messrs. Brady and Edmonds collected a sample of coal from this mine, the analysis of which, as reported by Prof. Hite, was published by Dr. White under No. 24 on pages 658-9 of Volume II and republished by him under the same number on pages 212-213 of Volume II(A) and page 248 of Bulletin 2 of the W. Va. Geological Survey. This analysis is given under **Mine No. 161** in Table 1 at the end of this Chapter. The thickness of coal reported by Brady and Edmonds in the references cited was 5′ 2″.

Messrs. Brady and Edmonds also collected a sample of the coke made at this mine, the results of an analysis of which by Prof. Hite were published by Dr. White under No. 7 on pages 603-4 of Volume II and republished by him under the same number on page 214 of Volume II(A) and page 249 of Bulletin 2 of the W. Va. Geological Survey. This analysis is given under **Mine No. 161** in Table 2 at the end of this Chapter.

Two sections of the bed were measured and sampled by J. S. Burrows of the U. S. Geological Survey in 1904. **Section A** (1197) was measured at the face of the left main heading and **Section B** (sample 1198) was measured at the face of the main entry of "the Straight". At both sections the coal was 5′ 2″ thick, without shale partings.

Samples 1595 and 1609 were of 10 tons and 5 tons of run-of-mine coal, respectively.

Sample No. 1401 was from sample used in making boiler test No. 51.

Sample No. 1607 was from sample used in gas-producer test No. 23.

Sample No. 1398 was from sample used in coke test No. 7.

These 7 analyses were first published in Professional Paper No. 48 of the U. S. Geological Survey, page 255, the first 4 being republished in Bulletin 22 of the U. S. Bureau of Mines, page 241.

The bed was also measured and sampled at six points by H. M. Wolflin (of the U. S. Geological Survey), on July 7 to 9, 1909, as given on page 950 of Bulletin 22 of the U. S. Bureau of Mines.

Section A (sample 8099) was cut from face of left air-course 9, off main entry, about 3,200 feet approximately southeast of No. 2 shaft; thickness of bed and of coal sampled, 4′ 11⅛″.

Section B (sample 8206) was cut from face of left entry 7, off main entry, about 2,500 feet southeast of No. 2 shaft; thickness of bed, 6′ 3″; thickness of coal sampled, 6′ 0″.

Section C (sample 8207) was cut from face of left air-course 9, off Carline entry, about 2,600 feet approximately northeast of No. 2 shaft; thickness of coal sampled, 4′ 10¼″.

Section D (sample 8208) was cut from room 15, off right entry 11, off main entry, about 3,000 feet northeast of No. 2 shaft; thickness of bed and of coal sampled, 4′ 4½″.

Section E (sample 8209) was cut from face of left entry 3, off Simpson entry, about 2,800 feet south of No. 2 shaft; thickness of bed and of coal sampled, 5′ 8″.

Section F (sample 8210) was cut from Tucker's main air-course, opposite left entry 10, off Tucker entry, about 3,700 feet southeast of No. 1 slope; thickness of bed and of coal sampled, 5′ 0½″.

A **composite sample** was made by mixing samples 8099, 8206, 8207, 8208, 8209, and 8210, for an ultimate analysis, the results of which are shown under laboratory **No. 8291.** The latter analysis, along with an air-dried calculation of the same, was published by Dr. White under No. 5 in Table No. 8 on page 243 of Bulletin 2 of the W. Va. Geological Survey.

The analyses of these samples were published on pages 241-242 of Bulletin 22 of the U. S. Bureau of Mines.

The bed was also measured and sampled at three points by A. J. Hazlewood, of the U. S. Geological Survey, on August 27, 1909, as given on pages 950-1 of Bulletin 22 of the U. S. Bureau of Mines; Samples Nos. 50, 51, and 52, each taken in the face of Simpson entry. A **composite sample** was made by mixing samples 50, 51, and 52 for an ultimate analysis, the results of which are shown under laboratory No. 127. These four analyses are published on page 242 of Bulletin 22 of the U. S. Bureau of Mines.

	50	51	52
Thickness of bed............	5′ 10 ″	5′ 11 ″	6′ 0 ″
Thickness of coal sampled....	5 7½	5 8½	5 7½

The bed was also measured and sampled at two points on December 13, 1909, by P. M. Riefkin, of the U. S. Geological Survey, as given on page 951 of Bulletin 22 of the U. S. Bureau of Mines.

Samples 9614 and 9615 were both taken from the face of Collins heading, off right entry 8, both being wet when taken; thickness of bed, sample 9614, 4′ 4¾″; sample 9615, 4′ 8¼″; thickness of coal sampled, sample 9614, 3′ 9½″; sample 9615, 4′ 7½″.

The analyses of these two samples were published on page 242 of Bulletin 22 of the U. S. Bureau of Mines.

The above 20 analyses taken from the references cited are given under **Mine No. 161** in Table 3 at the end of this Chapter.

"Notes.—The coal was undercut in the bed, usually by hand and occasionally with chain machines, and was shot down with black powder. There were two tipples at this mine; the one at the shaft (known as No. 2 Opening) was equipped with bar screens with 1-inch, 1½-inch, 3-inch, and 5-inch openings. The slack was taken by belt elevator to boiler-house where there was a large storage bin, and from there was taken to coke ovens as needed. The tipple at the slope (known as No. 1 Opening) was also equipped with bar screens with 1½-inch and 4-inch openings, but these screens were not in use, all screened coal being prepared at No. 2 tipple. The coal was picked on the car. The daily output from both openings averaged about 1,200 tons, and an increase was probable. The capacity was about 2,500 to 3,000 tons. The future output was to be derived principally from advance work."

Some of the above samples would appear to have been taken from "Sun No. 2" Shaft (No. 162 on Map II), since the "Notes" refer to both openings, and also the locations where samples 8099, 8206, 8207, 8208, 8209 were taken are oriented from No. 2 shaft.

"For results of tests of this coal, see mention of specific tests as follows—steaming tests: U. S. Geol. Survey Prof. Paper 48, p. 873; Bull. 261, p. 82; Bureau of Mines Bull. 23, p. 69; producer-gas tests: U. S. Geol. Survey Prof. Paper 48, p. 1248; Bureau of Mines Bull. 13, pp. 216, 276; coking tests: U. S. Geol. Survey Prof. Paper 48, p. 1361; Bull. 261, p. 128; cupola tests of coke, U. S. Geol. Survey Prof. Paper 48, p. 1383; chemical analyses, Bureau of Mines Bull. 22, pp. 241, 242; also U. S. Geol. Survey Prof. Paper 48, p. 255; Bull. 261, p. 56."

A number of these tests, taken from the above references, are given on the following pages.

STEAMING TESTS.

Test No. 51.—Regular and special observations on test of West Virginia No. 7 coal, November 10, 1904.

REGULAR.

(Duration of trial, 10.183 hours).

Time	Steam pressure gage.	Temperatures.			Calorimeter.		Draft Pressures.		Flue gases.		
		Outside.	Boiler room.	Flue gases, base of stack.	Steam discharge.	Water separated in 10 minutes.	In hood, in inches of water.	In furnace, in inches of water.	CO_2.	O_2.	CO.
	Lbs.	°F.	°F.	°F.	Lbs.	Lbs.			P.C.	P.C.	P.C.
7:33 ..	83	......	......	525	......	......	0.37	0.07	......	......	......
7:40 ..	83	......	48	555	......	......	.5	.20	......	......	......
8:00 ..	79	38	......	562	......	......	.51	.25	......	......	......
8:20 ..	82	......	53	558	4.4	0.033	.53	.26	......	......	......
8:40 ..	88	37	53	555	......	......	.53	.22	......	......	......
9:00 ..	82	38	......	558	......	......	.54	.28	......	......	......
9:20 ..	85	37	75	570	4.13	0.3	.53	.25	8.0	10.8	0
9:40 ..	85	38	67	563	......	......	.54	.26	......	......	......
10:00 ..	79	38	62	557	......	......	.53	.25	......	......	......
10:20 ..	83	39	61	585	4.12	0.3	.59	.24	9.6	10.0	0
10:40 ..	80	39	60	573	......	......	.61	.26	......	......	......
11:00 ..	86	39	59	562	......	......	.61	.3	......	......	......
11:20 ..	79	39	59	560	4.27	.068	.60	.2	9.0	10.8	0
11:40 ..	83	39	59	558	......	......	.60	.3	......	......	......
12:00 ..	84	40	60	565	......	......	.61	.27	......	......	......
12:20 ..	86	40	60	565	4.36	.032	.60	.29	8.9	11.1	0
12:40 ..	85	40	60	565	......	......	.60	.28	......	......	......
1:00 ..	80	42	61	572	......	......	.17	.03	......	......	......
1:20 ..	83	42	63	563	4.16	.04	.41	.17	7.1	13.1	0
1:40 ..	85	41	63	525	......	......	.45	.19	......	......	......
2:00 ..	84	42	62	560	......	......	.62	.28	......	......	......
2:20 ..	80	42	62	565	4.13	.045	.60	.21	7.4	12.1	0
2:40 ..	84	41	62	600	......	......	.60	.22	......	......	......
3:00 ..	85	42	62	605	......	......	.59	.22	......	......	......
3:20 ..	81	41	62	600	4.04	.02	.59	.20	8.6	11.1	0
3:40 ..	83	41	63	595	......	......	.60	.26	......	......	......
4:00 ..	81	41	62	583	......	......	.52	.23	......	......	......
4:20 ..	82	41	62	570	4.10	.042	.50	.19	8.4	10.8	0
4:40 ..	84	40	62	592	......	......	.52	.19	......	......	......
5:00 ..	83	40	62	570	......	......	.42	.06	......	......	......
5:20 ..	83	40	64	560	4.27	.043	.47	.12	8.0	11.8	0
5:40 ..	87	......	62	527	......	......	......	......	......	......	......
5:44 ..	84	......	......	......	......	......	......	......	......	......	......
Total	2,741	1,117	1,770	18,123	41.98	.383	16.46	6.74	75	101.6	......
Average	83	40	61	566	4.198	.0383	.53	.217	8.33	11.3	0

Test No. 51.—Regular and special observations on test of West Virginia No. 7 coal, November 10, 1904—Continued.

SPECIAL.

Time.	Height of Water.		Weight of coal burned.		Weight of water fed to boiler.	
	In tank.	In gage glass.	During period.	Total.	During period.	Total.
	Inches.	Inches.	Pounds.	Pounds.	Pounds.	Pounds.
Start, 7:43	40	4	....	....	....	....
8:00	35½	3¾	700	700	2,254	2,254
8:37	41½	3½	700	1,400	3,534	5,788
9:31	38	4	700	2,100	5,108	10,896
10:30	41	2¾	700	2,800	6,763	17,659
11:24	42¾	3	700	3,500	5,979	23,638
12:26	34¼	2½	700	4,200	6,350	29,988
1:43	40¼	3¾	700	4,900	6,221	36,209
2:30	39¾	3¼	700	5,600	4,638	40,848
3:21	36½	2¾	700	6,300	6,070	46,918
4:07	36	2½	700	7,000	5,820	52,738
5:39	38	4¼	700	7,700	8,792	61,530
Close, 5:44	40	4	....	....	480	62,010

RECORD OF FURNACE CONDITIONS.

Time.	Observation.	Time.	Observation.
	Boiler under a bank during night.	12:16	Fire raked, 14 inches thick.
7:00	Fire cleaned.	12:36	Fire raked, 14 inches thick.
7:43	Test started, fire 3½ inches thick.	12:51	Cleaning fire.
7:55	Fire raked, 6 inches thick.	1:13	Fire cleaned, 6 inches thick.
8:24	Fire raked, 10 inches thick.	1:50	Fire raked, 10 inches thick.
8:59	Fire raked, 14 inches thick.	2:02	Fire raked, 12 inches thick.
9:23	Fire raked, 14 inches thick.	2:27	Fire raked, 12 inches thick.
9:52	Fire raked, 14 inches thick.	2:45	Fire raked, 12 inches thick.
10:05	Fire sliced.	2:56	Fire sliced.
10:21	Fire raked, 14 inches thick.	3:15	Fire raked, 14 inches thick.
10:57	Fire raked, 14 inches thick.	3:55	Fire raked, 12 inches thick.
11:12	Fire raked, 14 inches thick.	4:15	Fire raked, 14 inches thick.
11:21	Fire sliced.	4:35	Fire raked, 14 inches thick.
11:35	Fire raked, 14 inches thick.	4:58	Cleaning fire.
11:52	Fire raked.	5:12	Fire cleaned, 5 inches thick.
		5:44	Test closed, fire 3½ inches thick.

Ash white and of light weight. Coal burned with short white flame. 100 firings during test.

Designation and origin of fuel:	
Designation of coal	West Virginia No. 7. (Mine 161 on Map II).
Designation of bed	Sewell
At or near	Sun
Size of fuel as shipped	Run-of-mine.
Condition of fuel as fired:	
Appearance	[a] Bright
State of weather:	
Morning	Cloudy
Afternoon	Cloudy
Boiler No.	2
Kind of grate in boiler	Plain
Test:	
Date	11.10.04
Duration (hours)	10.18
Grate surface (square feet)	40.55
Kind of draft	Natural
Average pressure:	
Barometer (inches of mercury)	29.67
Steam gage (pounds per square inch)	83.0

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[a] Small coal [illegible] per cent; lump, [illegible] per cent.

Force of draft (inches of water):	
Hood	.53
Furnace	.22
Under fire	.00
Average temperature (°F.):	
External air	40.9
Fire room	61.0
Steam	325.8
Feed water	
In tank	56.0
Entering boiler	....
Escaping gases	566
Furnace	....
Fuel:	
Total weight of fuel consumed (pounds)—	
As fired	7,700
Dry	7,494
Ash and refuse—	
Total (pounds)	623
Clinker (per cent.)	62
Total weight of combustible (pounds) determined from—	
Actual weight of ash	6,871
Analyses of ash and coal	6,599
Ash and refuse in dry fuel (per cent.)	8.31
Proximate analysis of fuel as fired (per cent.):	
Moisture	2.68
Volatile	20.23
Fixed Carbon	68.27
Ash	8.82
Sulphur (separately determined)	1.52
Ultimate analysis of dry fuel (per cent.):	
Carbon	79.27
Hydrogen	4.13
Oxygen	4.97
Nitrogen	1.01
Sulphur	1.56
Ash	9.06
Analyses of ash and refuse (per cent.):	
Carbon	34.60
Earthy matter	65.40
Fuel consumed per hour (pounds):	
Dry	736
Combustible determined from—	
Actual weight of ash	675
Analyses of ash and coal	648
Dry per sq. ft. of grate area	18.15
Combustible per sq. ft. of water-heating surface determined from—	
Actual weight of ash	.332
Analysis of ash	.319
Calorific value of fuel per pound (B. T. U.):	
By oxygen calorimeter—	
Dry fuel	14,305
Combustible	15,730
By analysis—	
Dry fuel	13,770
Combustible	15,142
Quality of steam (per cent.):	
Moisture	.90
Factor of correction (dry steam=unity)	.9931
Water evaporation:	
Water fed to boiler (pounds)—	
Total weight	62,010
Equivalent from and at 212° F.	74,307
Actually corrected for quality of steam (lbs.)	61,582
Factor	1.1983
Equivalent converted into dry steam from and at 212° F. (lbs.)	73,794
Per hour (pounds)—	
Corrected for quality of steam	6 048
Equivalent from and at 212° F.—	
Total	7,247
Per sq. ft. of water-heating surface	3.57
Horse-power:	
Developed on test	210.1
Builders' rating	210
Per cent. of rated horse-power developed	100.0

Economic results (pounds of water evaporated per pound of fuel):	
Apparent under actual conditions as fired	8.05
Equivalent from and at 212° F.	
As fired	9.58
Dry	9.85
Combustible determined from—	
Actual weight of ash	10.74
Analysis of ash and coal	11.18
Efficiency (per cent.) of:	
Boiler, from actual weight of ash	65.94
Boiler, from analysis of ash and coal	68.64
Boiler and grate	66.49
Smoke (per cent. of black)	20.4
Kind of firing	Alternate
Methods of firing:	
Thickness of fire (inches)	14
Interval between—	
Normal firings (minutes)	6.4
Times of leveling or breaking up (hours)	.4
Analysis of dry gases (per cent):	
Carbon dioxide (CO_2)	8.33
Oxygen (O_2)	11.30
Carbon monoxide (CO)	.00
Nitrogen (N_2) (by difference)	80.37
Pounds of dry gases per pound of combustible	25.97
Heat balance:	
British Thermal Units—	
Total	15,730
Absorbed	10,797
Loss of heat due to—	
Moisture—	
In fuel	39
Of burning hydrogen	526
Carried away in dry gases	3,146
Incomplete combustion of carbon	0
Radiation and other losses	1,222
Per cent.:	
Absorbed by boiler	68.64
Loss of heat due to—	
Moisture—	
In fuel	.25
Of burningg hydrogen	3.34
Carried away in dry gases	20.00
Incomplete combustion of carbon	.00
Radiation and other losses	7.77

Log of producer-gas test No. 23, West Virginia No. 7 Coal, February 2, 3, 1905.

(Coal from mine of the New River Smokeless Coal Company, Sun, W. Va.)

Time.	Coal consumed by producer (pounds).	Gas meter (cubic feet).	Temperature of gas (°F.).	Water meter (cubic feet).	Manometers at gas meter (inches water).		Auxiliary motors. Watt meter.	Speed counters on gas engine.	Load.		Temperature of gas leaving producer (°C.).	Manometers at producer.		Gas calorimeter.						
														Temperatures (°C).			Cubic centimeters of water collected.	Cubic feet of gas.	B. T. U.	
															Water.					
					1	2			Volts.	Amperes.		Air entering (inches mercury).	Gas leaving (inches water).	Gas.	Inlet.	Outlet.			As read.	Standardized.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
9:10 a. m.[a]	......	482,300	40	57,320	2.2	0.4	135,900	149,230	239	634	540	......	......	......	......	......	......	......	......	(b)
9:30 a. m.	......	489,250	47	......	2.2	.5	....	151,237	239	634	610	......	......	......	......	......	......	......	......	(b)
9:50 a. m.	......	496,100	51	......	2.2	.2	....	153,273	239	624	660	0.6	6.5	......	......	......	......	......	......	(b)
10:00 a. m.	300	....	.....	......	......	......	....	....	......	......	......	......	......	......	......	......	......	......	......	......
10:10 a. m.	......	503 100	53	......	2.3	.6	138,100	155,320	238	624	640	......	......	......	......	......	......	......	......	(b)
10:30 a. m.	......	509,780	55	......	2.3	.6	....	157,372	240	624	680	......	......	2.0	4.2	8.8	730	0.1	132.9	125.4
10:50 a. m.	......	516,800	56	......	2.3	.2	....	159,400	241	624	670	......	......	8.0	4.2	9.2	720	.1	142.8	136.8
11:00 a. m.	300	....	.....	......	......	......	....	....	......	......	......	......	......	......	......	......	......	......	......	......
11:10 a. m.	......	524,120	58	......	2.1	—.1	140,400	161,424	239	624	690	......	......	9.0	4.3	9.2	720	.1	139.7	134.1
11:30 a. m.	......	531,680	59	......	2.1	—.2	....	163,452	238	614	670	.65	7.0	11.0	4.3	9.5	750	.1	154.7	149.6
11:50 a. m.	......	539,150	60	......	2.0	—.6	....	165,468	239	629	700	......	......	......	......	......	......	......	......	(b)
12:00 m.	300	....	.....	......	......	......	....	....	......	......	......	......	......	......	......	......	......	......	......	......
12:10 p. m.	......	546,700	62	......	2.1	—.2	142,700	167,494	241	624	680	......	......	12.0	4.0	9.4	720	.1	451.0	149.5
12:30 p. m.	......	554,000	62	......	2.1	—.2	....	169,525	240	614	650	.5	6.0	13.0	4.0	9.9	710	.1	165.9	161.4
12:50 p. m.	......	561,300	63	......	2.1	—.4	....	171,569	238	629	660	......	......	13.5	4.0	9.8	790	0.1	181.3	176.2
1:10 p. m.	......	568,400	63	......	2.2	+.4	144,930	173,583	239	624	670	......	......	14.5	4.2	9.7	780	.1	170.2	166.1
1:15 p. m.	300	....	.....	......	......	......	....	....	......	......	......	......	......	......	......	......	......	......	......	......
1:30 p. m.	......	575,250	63	......	2.2	.5	....	175,608	240	619	650	.5	6.0	14.5	4.2	9.9	780	.1	176.2	171.8
1:50 p. m.	......	581,990	63	......	2.3	.8	....	177,638	240	634	650	......	......	15.5	4.4	10.3	750	.1	175.7	162.5
2:10 p. m.	......	588,700	64	58,264	2.2	.4	147,360	179,669	238	629	660	......	......	14.0	4.2	9.4	830	.1	178.9	174.3

[a] February 2, Average barometer for entire test, 30.73 inches.

[b] Water pipe to calorimeter frozen.

Log of producer-gas test No. 23, West Virginia No. 7 Coal, February 2, 3, 1905—Continued.

(Coal from mine of the New River Smokeless Coal Company, Sun, W. Va.)

Time.	[illegible]	[illegible]	[illegible]	[illegible]	Manometers at gas meter (inches water).		[illegible]	[illegible]	Load.		[illegible]	Manometers at producer.		Gas calorimeter. Temperature (°C.).			[illegible]	Cubic feet of gas.	B.T.U.	
					1	2			[illegible]	[illegible]		[illegible]	[illegible]	Gas.	Water. Inlet.	Water. Outlet.			[illegible]	[illegible]
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
2.30 p. m.		595,400	63		2.2	1	......	181,695	239	585	680	......	......	13.5	4.2	9.0	850	.1	161.9	156.4
2.40 p. m.	500						......	......	......	......	......	......	......	......	......	......	......	......	......	......
2.50 p. m.		602,440	64		2.3	1	......	183,718	238	634	610	.5	6.0	13.5	4.2	8.9	830	.1	154.7	150.4
3.10 p. m.		609,200	64		2.3	.6	149,110	185,750	239	629	620	......	......	13.5	4.2	9.2	860	.1	170.6	165.9
3.30 p. m.		615,810	64		2.3	.5	......	187,782	238	624	630	......	......	13.0	4.2	8.9	910	.1	169.1	164.4
3.50 p. m.		622,270	64		2.3	.5		189,813	240	629	650	......	......	13.0	4.2	8.7	980	.1	174.5	169.5
4.00 p. m.	500						......	......	......	......	......	......	......	......	......	......	......	......	......	......
4.10 p. m.		629,180	64	78,020	2.3	.5	151,000	191,846	240	624	580	.3	5.5	12.5	4.0	8.2	1,100	.1	183.3	179.6
4.30 p. m.		635,630	64		2.3	.5	......	193,881	240	624	610	......	......	13.0	4.2	10.1	740	.1	171.8	166.8
4.50 p. m.		642,150	64		2.4	.8	......	195,910	240	619	620	......	......	12.0	4.2	10.4	690	.1	169.4	165.0
5.10 p. m.ᵃ		648,030	64		2.4	.9	153,120	197,957	240	614	640	......	......	12.0	4.3	9.7	850	.1	182.1	176.6
5.20 p. m.	500						......	......	......	......	......	......	......	......	......	......	......	......	......	......
5.30 p. m.		654,400	64		2.4	.8	......	199,972	240	619	600	.3	6.0	11.0	4.3	10.0	720	.1	189.9	183.4
5.50 p. m.		661,400	64	......	2.4	.8	......	202,006	240	614	630	......	......	12.5	4.1	10.0	730	.1	161.8	157.0
6.10 p. m.		666,500	64	78,572	2.4	.5	155,430	204,035	240	624	640	......	......	11.0	4.2	9.1	830	.1	171.0	165.3
6.30 p. m.	500	673,000	64		2.3	.6	......	206,058	241	629	660	......	......	11.0	4.3	8.7	1,000	.1	174.6	168.7
6.50 p. m.		679,250	64		2.4	.7	......	208,092	241	619	650	......	......	12.0	4.3	9.1	910	.1	173.4	167.8
7.10 p. m.		685,100	64		2.3	.6	157,100	210,110	240	624	660	.6	7.0	12.0	4.3	8.7	990	.1	173.0	167.5
7.30 p. m.	500	692,000	64	......	2.2	.0	......	212,128	241	619	660	......	......	12.0	4.1	8.6	1,000	.1	166.6	161.3
7.50 p. m.		699,100	64		2.2	.0	......	214,157	240	619	710	......	......	12.5	4.1	8.6	1,000	.1	166.6	161.0
8.10 p. m.		706,150	64	79,110	2.2	.0	159,600	216,180	240	624	650	......	......	12.5	4.3	9.7	760	.1	162.7	157.8
8.15 p. m.	500						......	......	......	......	......	......	......	......	......	......	......	......	......	......

ᵃ At 5.15 p. m. the engine igniters were working badly. The load was reduced for two minutes.

Log of producer-gas test No. 23, West Virginia No. 7 Coal, February 2, 3, 1905—Continued.

(Coal from mine of the New River Smokeless Coal Company, Sun, W. Va.)

Time	Coal consumed by producer (pounds).	Gas meter (cubic feet).	Temperature of gas (°F.)	Water meter (cubic feet).	Manometers at gas meter (inches water).		Auxiliary motors. Watt meter.	Speed counters on gas engine.	Load.		Temperature of gas leaving producer (°C.).	Manometers at producer.		Gas calorimeter						
					1	2			Volts.	Amperes.		Air entering (inches mercury).	Gas leaving (inches water).	Temperature (°C).			Cubic centimeters of water collected.	Cubic feet of gas.	B. T. U.	
														Gas.	Water.				As read.	Standardized.
															Inlet.	Outlet.				
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
8:30 p. m.	......	713,200	64	......	2.2	.1	....	218,210	241	624	620	.5	6.0	12.5	4.3	9.2	880	.1	171.0	165.9
8:50 p. m.	......	720,400	64	......	2.2	.0	....	220 234	241	624	630	......	......	12.5	4.4	8.8	1,010	.1	176.2	170.9
9:10 p. m.	......	727,650	64	......	2.0	—.4	161,600	222,250	239	624	660	......	......	12.5	4.3	10.5	590	.1	145.2	140.9
9:15 p. m.	300	....	.....	......	......	......	....	....	.....	.....	......	......	......	......	.....	.....	......	.....	......	......
9:30 p. m.	......	735,200	63	......	2.0	—.5	....	224,266	240	619	650	.4	5.0	12.5	4.2	10.2	600	.1	142.8	138.5
9:50 p. m.	......	743,000	63	......	2.0	—.8	....	226,275	238	624	640	......	......	12.0	4.3	9.5	670	.1	134.1	129.7
10:10 p. m.	300	751,550	63	......	2.0	—.8	163,800	228,285	239	624	660	......	......	12.0	4.4	9.5	700	.1	141.6	136.9
10:30 p. m.	300	758,650	63	......	2.0	.9	....	230,292	238	624	730	......	......	12.5	4.3	9.6	660	.1	138.8	134.7
10:50 p. m.	......	765 950	63	......	2.0	—.9	....	232,307	238	619	......	......	......	12.5	4.2	9.3	680	.1	137.7	133.6
11:10 p. m.	......	773,700	63	......	2.0	—.6	166,050	234 312	243	614	580	.5	7.0	12.5	4.2	9.4	750	.1	158.7	153.9
11:30 p. m.	......	781,300	.....	......	2.0	.8	....	236.312	240	624	710	......	......	12.5	4.3	9.3	820	.1	162.6	157.8
11:45 p. m.	300	....	.....	......	......	......	....	....	.....	.....	......	......	......	......	.....	.....	......	.....	......	......
11:50 p. m.	......	789,000	64	......	2.0	—.8	....	238,325	240	624	650	......	......	13.0	4.3	9.1	770	.1	146.8	142.6
12:10 a. m.[d]	......	796,570	64	59,978	2.1	—.3	168,250	240,342	242	634	660	......	......	12.5	4.3	9.2	840	.1	163.1	158.3
12:30 a. m.	......	804,210	64	......	1.9	—.5	....	242,372	239	575	720	.4	6.0	11.5	4.3	8.9	890	.1	162.6	157.1
12:50 a. m.	......	811,860	64	......	2.0	—.4	....	244 384	239	619	710	......	......	12.5	4.5	9.8	670	.1	142.0	137.7
1:10 a. m.	......	819,550	64	......	2.0	—.5	170,220	246,397	238	624	750	......	......	13.0	4.3	10.0	650	.1	146.8	142.5
1:30 a. m.	......	827,330	64	......	2.0	—.3	....	248,411	237	619	760	......	......	12.5	4.4	9.6	660	.1	136.1	132.1
1:50 a. m.	......	834,870	64	......	2.0	—.2	....	250,435	240	604	730	......	......	12.5	4.3	10.5	620	.1	152.4	147.8
2:00 a. m.	300	....	.....	......	......	......	....	....	.....	.....	......	......	......	......	.....	.....	......	.....	......	......
2:10 a. m.	......	842,690	65	......	2.0	—.8	172,250	252,454	235	614	640	.2	6.5	13.0	4.2	10.0	720	.1	165.5	160.7
2:30 a. m.	......	850,980	65	......	1.9	—1.1	....	254,459	235	629	720	......	......	13.0	4.3	9.9	690	.1	153.2	148.7
2:50 a. m.	......	859,380	65	......	2.0	—.9	....	256,456	240	594	740	......	......	12.5	4.2	10.2	640	.1	150.8	146.3
3:00 a. m.	300	....	.....	......	......	......	....	....	.....	.....	......	......	......	......	.....	.....	......	.....	......	......

[d] February 3.

Log of producer-gas test No. 23, West Virginia No. 7 Coal, February 2, 3, 1905— Continued.

(Coal from mine of the New River Smokeless Coal Company, Sun, W. Va.)

Time	Coal consumed by producer (pounds).	Gas meter (cubic feet).	Temperature of gas (°F.).	Water meter (cubic feet).	Manometers at gas meter (inches water).		Electric meters. Watt-meter.	Speed counters on gas engine.	Load.		Temperature of gas leaving producer (°C.).	Manometers at producer.		Gas calorimeter						
														Temperature (°C.).					B. t. u.	
															Water.					
					1	2			Volts.	Amperes.		Air entering (inches mercury).	Gas leaving (inches water).	Gas.	Inlet.	Outlet.	Cubic centimeters of water collected.	Cubic feet of gas.	As read.	Standardized.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
3:10 a. m.	......	867,810	65	......	2.4	+1.0	174,390	258,479	243	619	640	......	......	13.0	4.3	11.2	510	.1	139.7	135.6
3:30 a. m.	......	873,880	65	......	2.4	1.1	......	260,503	244	575	650	......	......	12.5	4.3	11.6	570	.1	165.1	160.1
3:50 a. m.	......	879,440	65	......	2.4	.8	......	262,533	241	619	650	......	......	13.0	4.3	10.2	720	.1	168.2	163.3
4:00 a. m.	300	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......
4:10 a. m.	......	885,800	65	......	2.4	.6	176,400	264,551	241	614	590	......	......	13.0	4.2	9.4	840	.1	173.4	168.3
4:30 a. m.	......	892,240	64	......	2.4	.4	......	266,576	241	614	640	......	......	13.0	4.2	11.6	500	.1	146.8	142.6
4:50 a. m.	......	898,730	64	......	2.4	.8	......	268,607	240	614	670	......	......	12.5	4.2	11.2	530	.1	147.2	142.8
5:10 a. m.	......	905,400	64	......	2.4	.4	178,420	270,631	238	614	730	......	......	13.0	4.2	10.5	610	.1	152.4	147.9
5:15 a. m.	300	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......
5:30 a. m.	......	912,600	64	......	2.4	.0	......	272,643	240	634	680	......	......	13.0	4.2	10.0	640	.1	147.2	142.9
5:50 a. m.	......	916,245	64	......	2.3	−1.0	......	274,650	238	614	760	......	......	13.5	4.2	9.4	750	.1	154.7	150.7
6:10 a. m.	......	927,890	64	61,219	2.2	.0	180,500	276,646	241	604	800	......	......	13.0	4.2	9.6	660	.1	141.2	137.0
6:15 a. m.	300	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......
6:30 a. m.	......	935,100	64	......	2.4	+.5	......	278,654	243	624	660	......	......	13.0	4.2	10.7	590	.1	151.9	147.5
6:50 a. m.	......	942,150	64	......	2.4	.4	......	280,688	240	625	680	......	......	12.5	4.3	10.3	660	.1	157.1	152.1
7:10 a. m.	......	949,900	64	......	2.3	.4	182,710	282,715	240	624	......	......	......	13.0	4.3	10.8	580	.1	149.6	145.2
7:30 a. m.	300	957,150	64	......	2.4	.8	......	284,742	240	624	660	......	......	12.5	4.3	10.6	570	.1	142.5	138.2
7:50 a. m.	......	964,550	64	......	2.4	.4	......	286,773	240	624	660	......	......	12.0	4.3	11.2	590	.1	161.5	156.4
8:10 a. m.	......	971,120	64	61,652	2.4	.8	184,810	288,802	241	629	690	......	......	13.5	4.3	11.3	610	.1	169.4	165.0
8:30 a. m.	......	978,200	64	......	2.4	1.0	......	290,837	240	624	730	......	......	14.5	4.4	11.3	580	.1	158.7	154.8
8:50 a. m.[a]	......	......	......	......	......	......	......	......	......	......	......	......	......	13.5	4.3	11.1	580	.1	157.5	153.4

[a] At 8:50 a. m. the igniter rod on the engine broke, causing the engine to stop suddenly.

West Virginia No. 7, test 23.—(Mine No. 161 on Map II). This fuel was of high grade and it proved an excellent producer coal, yielding a rich gas of uniform quality.

Designation of fuel	West Virginia No. 7
Origin of fuel sample:	
Name of bed	Sewell
Location of mine or deposit	Sun
Duration of test (hours)	22⅔
Size of fuel:	
As shipped	Run-of-mine
Proximate analysis of fuel as fired (per cent.):	
Moisture	2.99
Volatile Matter	21.19
Fixed Carbon	69.15
Ash	6.67
Sulphur (separately determined)	.92
Total fuel charged to producer (pounds):	
As fired	6,000
Dry	5.820
Combustible	5,420
Refuse (determined from analysis)	400
Fuel charged per hour (pounds):	
In producer—	
As fired	264.9
Dry	256.9
Combustible	239.1
In producer plant –	
As fired	299.2
Dry	290.2
Combustble	270.1
Per square foot of fuel-bed area—	
As fired	6.88
Dry	6.68
Combustible	6.22
Calorific value (British Thermal Units):	
Fuel—	
Per pound—	
As fired	14,283
Dry	14,720
Combustible	15,800
Per hour as fired	3,780,000
Standard gas (at 62° F. and 14.7 pounds pressure)—	
Per pound of fuel—	
As fired	12,720
Dry	13,140
Per cubic foot	154.2
Per brake horse-power hour	14,380
British Thermal Units equivalent to stated horse-power per minute:	
Gas	56,090
Indicated	11,530
Brake	9,930
Electrical	8,440
Production of gas (cubic feet):	
Meter per hour	21,290
Standard gas (at 62° F. and 14.7 pounds pressure)—	
Total	494,990
Per hour	21,850
Per pound of fuel charged—	
In producer—	
As fired	82.5
Dry	85.1
Combustible	91.4
Total used by producer plant—	
As fired	73.0
Dry	75.3
Combustible	80.9
Standard gas consumed per horse-power hour (cubic feet):	
Indicated	80.3
Brake	93.3
Electrical	109.7

Composition of gas (per cent of volume):	
CO_2	9.62
O_2	.08
C_2H_4	.00
CO	12.75
H_2	10.31
CH_4	6.76
N_2	60.48
Gas horse-power	1,323
Revolutions per minute of gas engine	202.3
Explosions per minute per cylinder	101.2
Indicated horse-power:	
Indicator card pressures (pounds per square inch)—	
Maximum—	
Cylinder 1	238.0
Cylinder 2	217.0
Cylinder 3	271.0
At release—	
Cylinder 1	26.0
Cylinder 2	27.5
Cylinder 3	25.7
Mean effective pressure—	
Cylinder 1	58.5
Cylinder 2	59.0
Cylinder 3	52.0
Cylinder 1	93.6
Cylinder 2	94.1
Cylinder 3	84.3
Total	272.0
Brake horse-power:	
Developed at engine	234.1
Commercially available	221.0
Electrical horse-power:	
Developed at switchboard	199.1
Commercially available	187.7
Economic results: Fuel charged in producer per horse-power hour (pounds):	
Per brake horse-power—	
Developed at engine—	
As fired	1.13
Dry	1.10
Combustible	1.02
Commercially available—	
As fired	1.20
Dry	1.16
Combustible	1.08
Per electrical horse-power—	
Developed at switchboard—	
As fired	1.33
Dry	1.29
Combustible	1.20
Commercially available—	
As fired	1.41
Dry	1.37
Combustible	1.27
Economic results: Total fuel used by producer plant per horse-power hour (pounds):	
Per brake horse-power—	
Developed at engine—	
As fired	1.28
Dry	1.24
Combustible	1.15
Commercially available—	
As fired	1.35
Dry	1.31
Combustible	1.22
Per electrical horse-power—	
Developed at switchboard—	
As fired	1.50
Dry	1.46
Combustible	1.36

Commercially available—	
As fired	1.59
Dry	1.55
Combustible	1.44
Auxiliary power used by producer plant:	
To drive tar extractor (E. H. P.)	11.4
Used by producer (pounds)—	
Steam—	
Total	6,260
Per hour	276
Fuel equivalent of steam per hour—	
As fired	34.3
Dry	33.3
Combustible	31.0
Efficiency (per cent.):	
Of conversion and cleaning gas	....
Of producer plant	....
Thermal, based on stated horse-power and gas horse-power—	
Brake	17.7
Electrical	15.1
Of entire plant based on E. H. P., commercially available and fuel consumed	11.2

COKING TESTS.

West Virginia No. 7.

Mine 161 on Map II.

Coking test No. 37.—Run-of-mine coal from the New River Smokeless Coal Company, Sun, W. Va.

This test was made on unwashed coal, the charge weighing 8,000 pounds. It produced 5,119 pounds, or 64 per cent., of coke of good size and quality, but rather dark in color.

Analysis of West Virginia No. 7 coal.

Character of coal		Unwashed
Chemical laboratory number		1398
Moisture	Per cent.	3.85
Volatile matter	Per cent.	20.55
Fixed carbon	Per cent.	70.58
Ash	Per cent.	5.02
Sulphur	Per cent.	1.36
Remarks		Used in coking test No. 37

Coking test and coke production.

Test number		37 (unwashed)
When charged		Nov. 10, 1 p. m.
When drawn		Nov. 12, 9 a. m.
Time in oven	Hours	44
Coal charged (dry)	Lbs.	8,000
Large coke	Lbs.	3,478
Medium coke	Lbs.	1,641
Total coke made	Lbs.	5,119
Breeze and ash	Lbs.	287
Per cent. of yield:		
Large		43.4
Medium		20.5
Total		63.9
Breeze and ash		3.6

Physical and chemical properties of coke produced.

Grams in 1 cubic foot:	
Dry	10.3
Wet	19.46
Pounds in 1 cubic foot:	
Dry	39.14
Wet	73.94
Percentage by volume:	
Coke	44
Cells	56
Compressive strength per cubic inch (one-fourth ultimate strength) Lbs.	225
Height of furnace charge supported without crushing Feet	90
Hardness	2.4
Specific gravity	1.80
Chemical laboratory number	1414
Chemical analysis:	
Moisture Per cent.	0.67
Volatile matter Per cent.	1.23
Fixed carbon Per cent.	90.40
Ash Per cent.	7.70
Sulphur Per cent.	1.3
Phosphorus Per cent.	0.0061

"A good-sized coke, having all the appearance of a good fuel, was produced. Ash, sulphur, and phosphorus show up well, though the coke is softer than standard Connellsville coke, and its cell structure rather high. It has good burden-bearing qualities, but breaks up into small pieces with repeated handling."

Cupola Tests of Coke.

West Virginia No. 7.—Run-of-mine coal from the New River Smokeless Coal Company, Sun, W. Va. This test was made on unwashed coal, the charge weighing 8,000 pounds. It produced 5,119 pounds, or 64 per cent., of good size and quality, but rather dark in color.

Foundry test No. 2 on coke made from West Virginia No. 7 coal (unwashed), November 22, 1904.

(Coke from New River Smokeless Coal Company, Sun, W. Va.

ANALYSIS OF COKE.

	Per cent.
Sulphur	1.03
Sulphur in ash	.035
Volatile carbon	1.23
Fixed carbon	90.40
Ash	7.70
Phosphorus	.006
Moisture	.67

Specific gravity, 1.80.

Appearance, 5 (Connellsville, 10).

CHARGE.

(In pounds).

	1.	2.	3.	4.	5.	Total
Coke	210	55	55	55	55	430
Pig iron	630	405	405	405	405	2,250
Scrap	210	135	135	135	135	750

RECORD OF MELT.

Blast pressure averaged 7¾ ounces.
Blast on, 12:43 p. m.
Iron running, 12:53 p. m.
Iron in 10 minutes.

	Pounds.
Ladle No. 1, 12:57 p. m.	100
Ladle No. 2, 12:58 p. m.	112
Ladle No. 3, 12:59 p. m.	100
Ladle No. 4, 1:00 p. m.	118
Ladle No. 5, 1:01 p. m.	105
Ladle No. 6, 1:02 p. m.	103
Ladle No. 7, 1:03 p. m.	85
Ladle No. 8, 1:04 p. m.	125
Ladle No. 9, 1:05 p. m.	115
Ladle No. 10, 1:06 p. m.	125
Ladle No. 11, 1:07 p. m.	115
Ladle No. 12, 1:09 p. m.	115
Ladle No. 13, 1:10 p. m.	122
Ladle No. 14, 1:11 p. m.	125
Ladle No. 15, 1:12 p. m.	133
Ladle No. 16, 1:13 p. m.	128
Ladle No. 17, 1:14 p. m.	105
Ladle No. 18, 1:15 p. m.	83
Ladle No. 19, 1:17 p. m.	28
Ladle No. 20, 1:18 p. m.	55
Ladle No. 21	10
Total iron poured	2,107
Rate (pounds per hour)	6,020
Iron recovered	475
Coke recovered	72

Melting loss, 13.9 per cent.

Fluidity strips ran up very poorly. Iron dull. Results not satisfactory.

New River Collieries Co. (Formerly Sun Coal & Coke Co.)
"Sun No. 2 Shaft"—No. 162 on Map II.

On north bank of Bend Branch of Dunloup Creek, ½ mile west of Mine No. 161; **Sewell Coal**; elevation, 1530′ L.; shaft, 150′ deep. Section as reported by M. E. Kent, General Superintendent, to Teets.

			Feet.	Inches.
Slate draw			0	8
Coal	2′	4″		
Bone	0	5		
Coal, (slate floor)	2	0	4	9

For mine data and other information concerning analyses, see description of Mine No. 161. There are 120 coke ovens at this mine and No. 161.

Laboratory **No. 8291** was a composite sample made by mixing 6 samples taken from 6 different points in the Sun Mine (No. 1 and No. 2) and was published by Dr. White under No. 5 in Table No. 8 on page 243 of Bulletin 2 of the W. Va. Geological Survey. This analysis is given under **Mine No. 161** in Table 3 at the end of this Chapter.

McKell Coal & Coke Co. "Derryhale Mine"—No. 163 on Map II.

On Dunloup Creek, at Derryhale; **Sewell Coal**; elevation, 1670′ B.; section by Teets at drift mouth; data by Teets.

		Feet.	Inches.
Slate, sometimes sandstone, roof			
Coal, sulphurous	0′ 4″		
Coal, gas, columnar, soft, (slate floor)	4 10	5	2

"Mine is 23 feet by hand-level above Derryhale Station; coal shipped east to Newport News for steam purposes; output, 350 tons daily; capacity, 420 tons daily; number of men employed, 43 miners and 26 laborers; electric haulage; this mine has always been run under the above name and has been in operation 18 or 19 years; coal owned by this company; Wm. Cochran, Mine Superintendent, authority for mine data."

Messrs. Brady and Edmonds collected a sample of the coal from this mine for analysis by Prof. Hite, the results being published by Dr. White under No. 26 on pages 658 and 660 of Volume II and republished by him under the same number on pages 212-213 of Volume II(A) and page 248 of Bulletin 2 of the W. Va. Geological Survey. They also reported the thickness of the coal as 5′ 10½″. This analysis is given under **Mine No. 163** in Table 1 at the end of this Chapter.

The bed was measured and sampled at three points by H. M. Wolflin, of the U. S. Geological Survey, on June 23, 1909, as given on page 913 of Bulletin 22 of the U. S. Bureau of Mines.

Section A (sample 8005) was cut from the face of right entry 8, off the new main entry, 3,100 feet south of drift mouth; thickness of bed, 5′ 6″; thickness of coal sampled, 5′ 1⅞″.

Section B (sample 8006) was cut from the face of room 10, on left entry 5, off the new main entry, 3,500 feet southeast of drift mouth; thickness of bed, 5′ 5¾″; thickness of coal sampled, 5′ 4¼″.

Section C (sample 8023) was cut from a pillar in room 21, in Price's air-course, 3,800 feet northwest of drift mouth; thickness of bed and of coal sampled, 4′ 7⅛″.

A **composite sample** was made by mixing both the pillar and the face samples, 8005, 8006, and 8023. The results of an ultimate analysis of this sample are shown under laboratory **No. 8113.** The latter analysis, together with an air-dried calculation of the same, was published by Dr. White under No. 8 in Table No. 8 on page 244 of Bulletin 2 of the West Virginia Geological Survey.

The bed was also measured and sampled at two points in the mine by K. M. Way, of the U. S. Geological Survey, on September 23, 1907, as given on pages 913-914 of Bulletin 22 of the U. S. Bureau of Mines.

Section A (sample 5404) was measured in the face of an air-course, 3,500 feet northwest of the mine mouth; thickness of bed and of coal sampled, 4′ 10½″.

Section B (sample 5431) was measured in left entry 4, off the new main entry, 3,000 feet southeast of the drift mouth; thickness of bed and of coal sampled, 4′ 6½″.

These 6 analyses, together with the air-dried calculation of sample No. 8113 and the analyses of two samples (car) of run-of-mine coal shipped to the Norfolk, Virginia, Fuel-Testing Plant, as taken from page 225 of Bulletin 22 of the U. S. Bureau of Mines, are given under **Mine No. 163** in Table 3 at the end of this Chapter. The analyses of mine samples 5404 and 5431 and of car sample 5501 were previously published on page 15 of Bulletin 362 of the U. S. Geological Survey.

"Notes.—The coal from this mine, like that from other mines in the field, is a noted steam coal, and the output in 1909 was sold chiefly for steam production. The coal was undercut both by hand and with chain machines in the bottom part of the bed, and was shot down with short-flame explosives and black powder. The tipple was not equipped with screens, so that the entire output was shipped as run-of-mine coal. This is a coking coal, but there were no ovens at this plant. The coal was picked on the car. The daily output in June, 1909, averaged 500 tons, and 750 tons was the maximum day's run.

The future output for some time to come was to be derived mainly from advance work. At this mine the bed lies nearly flat. Thickness, fairly uniform, ranging as mined from 4′ 6″ to 5′ 6″; roof, shale, varying from 0 to 6 feet and capped with a heavy-bedded sandstone; roof rarely falls with the coal; floor, fairly hard clay with smooth surface; cover, for the most part, 50 to 200 feet thick."

The following details are taken from pages 21-22 of Bulletin 385 of the U. S. Geological Survey:

"Briquetting Tests, Jamestown No. 7 (Mine No. 163).

"Sample consisted of three cars of semi-bituminous run-of-mine coal * * *. The briquets made on the American machine from this coal with 7 per cent. of binder (Lab. No. 5563) stood the cohesion tests better than those made on the English machine with 6 per cent. of the same binder. Both were excellent briquets, gave fine metallic rings when struck, had smooth, firm surface, broke with difficulty, and had a firm glossy fracture."

Briquet Tests.

Test No.	261.	262.
Size of coal as used:		
Over 1-4 inch . . . . Per cent.	3.0	0.3
1-10 to 1-4 inch . . . . Per cent.	6.9	6.0
1-20 to 1-10 inch . . . . Per cent.	10.8	25.1
1-40 to 1-20 inch . . . . Per cent.	22.4	29.3
Through 1-40 inch . . . . Per cent.	56.9	39.3
Details of manufacture:		
Machine used	Eng.	Am.
Briquetting temperature . . . . °F.	198	193
Binder—		
Kind	W. G. P.	W. G. P.
Laboratory No. (see p. 8, Bull. 385)	5563	5563
Amount . . . . Per cent.	6	7
Weight of—		
Fuel briquetted . . . . Pounds	43,200	38,000
Briquets, average . . . . Pounds	3.53	.617
Heat value per pound—		
Coal as received . . . . B. T. U.	14,465	14,465
Briquets . . . . B. T. U.	14,886	14,717
Binder . . . . B. T. U.	16,718	16,718
Moisture in briquet mixture . . . . Per cent.	5.48	4.71
Drop test (1-inch screen):		
Held . . . . Per cent.	69.3	71.0
Passed . . . . Per cent.	30.7	29.0
Tumbler test (1-inch screen):		
Held . . . . Per cent.	74.0	80.5
Passed . . . . Per cent.	26.0	19.5
Fines through 10-mesh sieve . . . . Per cent.	88.6	95.2
Weathering test:		
Time exposed . . . . days	132	132
Condition	A	B
Water absorption:		
Time immersed . . . . days	35	11
Water absorbed . . . . Per cent	11.09	12.21
Average for first ten days . . . . Per cent	2.14	2.85
Specific gravity (apparent)	1.139	1.029

Chemical Analyses of Briquets.

Test No.		261.	262.
Laboratory No.		5583	5559
Proximate			
Moisture	Per cent.	2.70	0.93
Volatile matter	Per cent.	20.28	18.52
Fixed carbon	Per cent.	72.74	74.65
Ash	Per cent.	4.28	5.90
Sulphur	Per cent.	.81	.81
Ultimate:			
Hydrogen	Per cent.	4.94	4.75
Carbon	Per cent.	83.75	83.67
Nitrogen	Per cent.	1.45	1.50
Oxygen	Per cent.	4.77	3.37

Extraction Analyses.

		Pitch.	Fuel.	Briquets.	
			J-7	Test 261.	Test 262.
Laboratory No.		5563	5501	5583	5559
Air-drying loss	Per cent.	0	1.40	2.10	0.30
Extracted by CS_2:					
Air dried	Per cent.	90.33	.410	5,094	6.58
As received	Per cent.	90.33	.303	4,990	6.56
Pitch in briquet as received	Per cent.	....	....	5.12	6.85

New River Coal & Coke Co. No. 1 Mine (Formerly Dunloup Coal & Coke Co.) (Abandoned)—No. 164 on Map II.

On east hillside of Dunloup Creek, at southeast edge of Dunloup; **Sewell Coal**; elevation, 1730′ B.; section by Messrs. Brady and Edmonds, page 658, Volume II, of W. Va. Geological Survey.

	Feet.	Inches.
Coal	5	1

The analysis of a sample of coal collected at this mine by Messrs. Brady and Edmonds, as reported by Prof. Hite, and published by Dr. White under No. 32 on pages 658 and 660 of Volume II and republished by him under the same number on pages 212-213 of Volume II(A) and page 248 of Bulletin 2 of the Survey, is given under **Mine No. 164** in Table 1 at the end of this Chapter.

New River Coal & Coke Co. No. 2 Mine ("Dunloup Mine")—No. 165 on Map II.

On north hillside of Adkins Branch, ¾ mile southeast of Dunloup; **Sewell Coal**; elevation, 1850′ B.; section by Teets.

			Feet.	Inches.
Sandstone				
Slate, draw, 6″ to			1	6
Coal, sulphurous	0′	4″		
Coal, (slate floor)	5	2	5	6

"Principal office, Macdonald; used for domestic and steam purposes; shipped east; output, 750 tons daily; capacity, 900 tons daily; number of men employed, 110 miners and 65 laborers; electric haulage; A. S. Thompson, Mine Foreman, authority for data."

The bed was measured and sampled at two points on June 17, 1909, by J. J. Rutledge and H. M. Wolflin, and at three points on July 29, 1909, by A. J. Hazlewood, of the U. S. Geological Survey, as given on pages 915-916 of Bulletin 22 of the U. S. Bureau of Mines.

Section A (sample 7984) was cut from the face of right entry 1, off entry 4, about 3,550 feet northeast of drift mouth; thickness of bed, 6′ 0¾″; thickness of coal sampled, 5′ 9¾″.

Section B (sample 7985) was cut from right entry 10, about 5,200 feet east of drift mouth; thickness of bed and of coal sampled, 5′ 3½″.

Section C (sample 8603) was cut from break-through 50 feet from face of main entry, 4,000 feet from drift mouth; thickness of bed and of coal sampled, 5′ 8½″.

Section D (sample 8604) was cut from face of right entry 2, 2,000 feet from second drift mouth; thickness of bed and of coal sampled, 5′ 9½″.

Section E (sample 8605) was cut from face of right entry 1, off entry 4, about 3,600 feet northeast of drift mouth; thickness of bed and of coal sampled, 5′ 4½″.

A **composite sample** was made by mixing samples 8603, 8604 and 8605 for an ultimate analysis, the results of which are shown under laboratory **No. 8744.**

These 6 analyses, as taken from page 226 of Bulletin 22 of the U. S. Bureau of Mines, are given under **Mine No. 165** in Table 3 at the end of this Chapter.

"Notes.—The coal was mined entirely by hand—usually in the middle of the bed—and was shot down generally with black powder, though sometimes permissible explosives were used. The daily output in July, 1909, averaged about 800 tons; the capacity of the mine was about 1,000 tons. The future output was to be derived from advance work for several years. Dunloup No. 1 mine is 1½ miles distant; it was nearly exhausted but still contained some pillar coal. It was not working and not accessible at the time of visiting No. 2 mine. Thickness nearly uniform, varying as mined from 5′ 4″ to 6′ 3″; main roof, sandstone, between which and the coal is a weak shale, which in places falls with the coal; the floor is a shaly underclay with smooth surface."

The bed was also measured and sampled at five points in the mine by J. J. Rutledge, of the U. S. Bureau of Mines, on July 10, 1912, as given on pages 346-7 of Bulletin 85 of the last-mentioned Bureau.

Section A (sample 14383) was measured at the last break-through, to the right on the fifth main entry, 500 feet northeast of the mouth of the fifth main entry; thickness of bed and of coal sampled, 5′ 8½″.

Section B (sample 14384) was measured at the face of room 20, off right entry 4, off fourth main entry, 1,600 feet southeast of the mouth of the fourth main entry; thickness of bed and of coal sampled, 5′ 7″.

Section C (sample 14385) was measured at the face of room 2, off the first left air-course off the sixth main entry, 1,200 feet east of the mouth of the sixth main entry; thickness of bed and of coal sampled, 5′ 8″.

Section D (sample 14387) was measured at the face of room 5, off the air-course of the third main entry, 500 feet southeast of the mouth of the third main entry; thickness of bed, 5′ 2″; thickness of coal sampled, 5′ 1″.

Section E (sample 14388) was measured on pillar 17 on the sixth main entry, 1,040 feet southeast of the mouth of the sixth main entry.

Two composite samples were made: (1) by mixing samples 14383, 14384 and 14385 for an ultimate analysis, the results of which are shown under laboratory **No. 14386**; (2) by mixing samples 14387 and 14388 for an ultimate analysis, the results of which are shown under laboratory **No. 14389.**

These 7 analyses, as taken from page 111 of Bulletin 85 of the U. S. Bureau of Mines, are given under **Mine No. 165** in Table 3 at the end of this Chapter.

"Notes.—The Dunloup No. 2 mine is opened by six drift entries, and the coal from these various openings all goes to the same tipple. The coal is mined by the room-and-pillar system. At the time the mine was visited the coal was undercut by hand and shot down with FFF black blasting powder and permissible explosives. Thirty per cent. dynamite was used for brushing the roof. The tipple was equipped with shaking screens with openings 5½ by 3½ inches and 2½ by 1⅛ inches in size. Pickers were employed for picking the coal on a traveling belt. The daily production of the mine was 1,000 tons. The coal had a good appearance on the cars, the lumps being large but slightly broken by the loading system. There were 3 loading tracks, with a capacity for 29 empty and 32 loaded cars. All of the coal was shipped as run-of-mine. About 50 per cent. of the coal was obtained from new workings and the remainder from the older parts of the mine. Average thickness, 5′ 6″; dip, 1¾° northwest; roof 'draw slate' 4 to 6 inches thick, above which is a stratum of soft gray shale. There is a sandstone cap rock 20 feet above the coal. Floor, smooth, hard fire clay, and shale. Cover at points of sampling, 75 to 200 feet."

New River Coal & Coke Co. No. 5 Mine (Formerly Dunloup Coal & Coke Co.)—No. 166 on Map II.

On north hillside of Adkins Branch, 0.9 miles southeast of Dunloup; **Sewell Coal**; elevation, 1945′ B.

		Feet.	Inches.
Slate and sandstone roof			
Coal, sulphurous	0′ 4″		
Coal, gas, (slate floor)	5 0	5	4

"The sulphur at top of coal disappears when coal has a slate roof."

Turkey Knob Coal & Coke Co. "Turkey Knob" Mine—No. 167 on Map II.

On a branch of Dunloup Creek, at Turkey Knob; **Sewell Coal**; elevation, 1860′ B.; section by Teets near mouth of main heading.

	Feet.	Inches.
Slate and sandstone		
Coal, gas (slate floor)	5	1

"Used for domestic and steam purposes; shipped East and West; output, 700 tons daily; capacity, 700 tons daily; number of men employed, 85 miners and 70 laborers; 100 beehive coke ovens; 150 cars of coke per month; electric haulage; lease coal from McKell Coal Company; A. R. Jones, Mine Foreman, authority for data. The coke ovens at this plant were built from the Guyandot Sandstone directly over the Sewell Coal at this point. The quarry has now fallen over."

The analysis of a sample of coal from this mine, collected by Messrs. A. P. Brady and R. W. Edmonds and analyzed by Prof. Hite, was published by Dr. White under No. 27 on pages 658 and 660 of Volume II and republished by him under the same number on pages 212-213 of Volume II(A) and page 248 of Bulletin 2. This analysis is given under **Mine No. 167** in Table 1 at the end of this Chapter.

Messrs. Brady and Edmonds also collected a sample of the coke manufactured at this mine, the results of an analysis of which by Prof. Hite were published by Dr. White under No. 5 on pages 663-4 of Volume II and republished by him under the same number on page 214 of Volume II(A) and page 249 of Bulletin 2 of the Survey. This analysis is given under **Mine No. 167** in Table 2 at the end of this Chapter.

The bed was measured and sampled at four points by H. M. Wolflin, of the U. S. Geological Survey, on June 25 and 27, 1909, as given on pages 956-7 of Bulletin 22 of the U. S. Bureau of Mines.

Section A (sample 8035) was cut from the face of left entry 15, about 6,000 feet southeast of drift mouth; thickness of bed and of coal sampled, 6′ 5¼″.

Section B (sample 8036) was cut from room 10, off right entry 14, about 6,000 feet southeast of drift mouth; thickness of bed and of coal sampled, 4′ 7½″.

Section C (sample 8048) was cut from face of haulway, off right entry 7, about 4,000 feet southeast of drift mouth; thickness of bed and of coal sampled, 4′ 4¼″.

Section D (sample 8047) was cut from pillar in room 19 on left entry 12, 5,400 feet east of drift mouth; thickness of bed and of coal sampled, 5′ 0½″.

A **composite sample** was made by mixing samples 8035, 8036, 8047, and 8048 for an ultimate analysis, the results of which are shown under laboratory **No. 8103.**

These 5 analyses, as taken from page 244 of Bulletin 22 of the U. S. Bureau of Mines, together with an air-dried calculation of sample No. 8103 as published under No. 14 on page 244 of Bulletin 2 of the W. Va. Geological Survey, are given under **Mine No. 167** in Table 3 at the end of this Chapter.

"Notes.—The coal from this mine, like that from many others in this field, is soft and friable, and in ordinary mining operations makes rather a high percentage of slack. This slack was finely crushed and coked in beehive ovens. The coal was undercut, usually with pick, in bottom part of bed, and was shot down with black powder. The tipple was equipped with bar and shaking screens and a crusher for treating the slack. The daily output at time of sampling in 1909 averaged about 625 tons, and the capacity was approximately 800 tons. The future output was to be derived from both advance work and pillars. Thickness rather variable, ranging as mined from 6 feet 5 inches to 4 feet 4 inches; roof, clay shale (locally of sandstone), underlain with ¼ inch to 3 inches of draw clay shale; floor, hard, gray, shaly clay with smooth surface; cover, for the most part, 100 to 150 feet thick, possibly more."

New River Coal & Coke Co. "Macdonald Mine"—No. 168 on Map II.

On east hillside of Dunloup Creek, at Macdonald; **Sewell Coal**; elevation, 1805′ B.; section by Teets near pit mouth.

		Feet.	Inches.
Slate, sometimes sandstone, 4′ 0″ to		0	6
Coal, sulphurous, when sandstone roof	0′ 4″		
Coal, gas, soft, columnar	4 9	5	1
Slate			

"This mine has been in operation about 27 years and has always run under the above name; used for domestic and steam purposes; shipped east and west; output, 300 tons daily; capacity, 500 tons daily; number of men employed, 40 miners and 23 laborers; electric haulage; coal is leased from the McKell Coal Company; 124 beehive coke ovens, not in use now; J. B. Beard, Tipple Boss, authority for mine data. The Macdonald coke ovens were made from the Welch Sandstone directly under the Sewell Coal, some 20 to 30 feet of it being used. The sandstone is broken up with veins in all directions and comes out in small blocks."

A sample of coal from this mine was collected by Messrs. Brady and Edmonds and analyzed by Prof. Hite, the analysis being published by Dr. White under No. 34 on pages 658 and 660 of Volume II and republished by him under the same number on pages 212-213 of Volume II(A) and page 248 of Bulletin 2 of the Survey. This analysis is given under **Mine No. 168 in Table 1 at the end of this Chapter.**

Messrs. Brady and Edmonds also collected a sample of the **coke** made at this mining plant, the analysis of which by Prof. Hite being published by Dr. White under No. 6 on pages 663-4 of Volume II and republished by him under the same number on page 214 of Volume II(A) and page 249 of Bulletin 2 of the Survey. This analysis is given under **Mine No. 168 in Table 2 at the end of this Chapter.**

The bed was measured and sampled at two points by J. W. Groves and W. J. von Borries of the U. S. Geological Survey on October 24, 1905, as given on page 931 of Bulletin 22 of the U. S. Bureau of Mines.

Section A (sample 2359) was measured in room 11, on left entry 18, 7,720 feet in the mine opening; thickness of bed and of coal sampled, 5′ 0¾″.

Section B (sample 2360) was measured in room 16, on right entry 16, 7,600 feet southwest of the mine opening; thickness of bed, 5′ 4¼″; thickness of coal sampled, 4′ 8¾″.

The bed was also measured and sampled at three points on June 16, 1909, by David White, G. S. Rice, G. S. Pope, J. J. Rutledge, F. J. Simington, and H. M. Wolflin, of the U. S. Geological Survey, as given on page 931 of Bulletin 22 of the U. S. Bureau of Mines.

Section A (sample 7987) was cut from left entry 19, about 7,000 feet west of drift mouth; thickness of bed and of coal sampled, 4′ 8¼″.

Section B (sample 7993) was cut from cross entry 17, off left entry 18, about 6,000 feet southeast of drift mouth; thickness of bed, 4′ 9¼″; thickness of coal sampled, 4′ 8½″.

Section C (sample 7999) was cut from chain pillar opposite room 16, off right entry 11, about 4,200 feet southwest of drift mouth; thickness of bed, 5′ 9″; thickness of coal sampled, 5′ 8¼″.

A **composite sample** was made by mixing samples 7987, 7993 and 7999. The results of an ultimate analysis of this sample are shown under laboratory **No. 8112.**

The above 6 analyses, as given on page 233 of Bulletin 22 of the U. S. Bureau of Mines, are published under Mine No. 168 in Table 3 at the end of this Chapter. The analysis of a car sample (No. 2549) as given in the above reference, having been republished from page 216 of Bulletin 290 of the U. S. Geological Survey, is also published under **Mine No. 168** in Table 3 above mentioned.

"Notes.—The coal at this mine was undercut in the bed, usually by hand. The tipple was equipped with bar screens for lump and revolving screens 16 feet by 4 feet with ½-inch and ¾-inch openings. The slack was coked in beehive ovens, of which in June, 1909, 110 were fired and 290 idle. The coal was picked on the car. The daily output at the time of sampling in 1909 averaged about 425 tons; 600 tons was a maximum day's run. Almost the entire output in the near future was to come from pillar work. The dip of the bed varies greatly in places being as much as 12 feet in 100, the average being about 2 feet in 100. Thickness of coal, as mined, from 5 feet to 5 feet 6 inches; roof, gray shale, usually strong, but occasionally weak and slippy; floor, hard, gray shaly underclay; cover, for the most part, more than 75 feet thick."

"For results of tests of this coal, see mention of specific tests as follows—steaming tests: U. S. Geol. Survey Bull. 290, p. 216; Bureau of Mines Bull. 23, pp. 69, 187; coking tests: U. S. Geol. Survey Bull. 290, p. 217; Bull. 336, pp. 26, 35, 44; cupola tests of coke: U. S. Geol. Survey Bull. 336, pp. 52, 55, 58, 61, 64."

The following steaming tests are taken from pages 216 and 217 of Bulletin 290 of the U. S. Geological Survey:

Steaming Tests.

Test 285, West Virginia No. 19.—Size as shipped, run of mine. Size as used, over 1 inch, 14.8 per cent.; ½ inch to 1 inch, 11.6 per cent.; ¼ inch to ½ inch, 15.3 per cent.; under ¼ inch, 58.3 per cent. Duration of test, 9.97 hours. Kind of grate, rocking.

Test 289, West Virginia No. 19.—Size as shipped, run of mine. Size as used, over 1 inch, 13.4 per cent.; ½ inch to 1 inch, 11.7 per cent.; ¼ inch to ½ inch, 16.2 per cent.; under ¼ inch, 58.7 per cent. Duration of test, 8 hours. Kind of grate, plain.

MISCELLANEOUS ITEMS.

	Test 285.	Test 289.
Heating value of coal (B. T. U. per pound dry coal)	14,618	14,571
Force of draft:		
Under stack damper ... inch water	0.45	0.56
Above fire ... inch water	0.22	0.12
Furnace temperature ... °F.	2,419	2,065
Dry coal used per square foot of grate surface per hour ... Lbs.	15.55	13.86
Equivalent water evaporated per square foot of water-heating surface per hour ... Lbs.	2.92	2.84
Percentage of rated horse-power of boiler developed	81.8	79.6
Water apparently evaporated per pound of coal as fired ... Lbs.	8.53	8.25
Water evaporated from and at 212° F.:		
Per pound of coal as fired ... Lbs.	10.20	9.94
Per pound of dry coal ... Lbs.	10.45	10.26
Per pound of combustible ... Lbs.	11.48	11.45
Efficiency of boiler, including grate ... Per cent.	69.04	68.00
Coal as fired:		
Per indicated horse-power hour ... Lbs.	2.77	2.84
Per electrical horse-power hour ... Lbs.	3.42	3.51
Dry coal:		
Per indicated horse-power hour ... Lbs.	2.71	2.76
Per electrical horse-power hour ... Lbs.	3.34	3.40

Proximate Analyses.

	Test 285.	Test 289.
Moisture	2.44	3.07
Volatile Matter	20.59	20.58
Fixed Carbon	70.43	69.66
Ash	6.54	6.69
Totals	100.00	100.00
Sulphur	0.92	1.04

Ultimate Analyses.

	Test 285.	Test 289.
*Carbon	82.72	82.43
*Hydrogen	4.54	4.52
Oxygen	3.51	3.49
*Nitrogen	1.59	1.59
Sulphur	0.94	1.07
Ash	6.70	6.90
Totals	100.00	100.00

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*Figured from car sample.

Additional steaming tests of coal from the Macdonald Mine (168) are published on pages 69, 82, 97, 113, 127, 142, and 187 of Bulletin 23 of the U. S. Bureau of Mines. Briquets made from this coal were also tested (No. 331) and the results given on the above-mentioned pages of Bulletin 23.

The following summary of these tests are taken from page 187 of the last-mentioned Bulletin:

"**Test No. 285; No. 19.**—The coal caked in the fire. Automatic air admission was not operated. A thin layer of solid, heavy plastic clinker formed on the grate; it was easily removed.

"**Test No. 289; No. 19.**—The coal burned slowly and caked. Steam was used in the ash pit. Automatic air admission was not operated. A thin layer of dark, heavy, solid clinker formed on the grate; it was easily removed.

"**Test No. 331; No. 19 (briquets).**—The briquets burned freely and quickly, with a short flame, and did not crumble in the fire; they were broken in halves before firing. Automatic air admission was not operated. A thin layer of solid, heavy clinker, of dark-brown color, formed on the grate; it was easily removed. The test was too short for reliable results."

The following coking tests are taken from page 217 of Bulletin 290 of the U. S. Geological Survey:

Coking Tests.

Test 79, West Virginia No. 19—Size as shipped, run of mine. Size as used, finely crushed. Raw. Duration of test, 49 hours.

Coal charged	pounds	12,000
Coke produced	pounds	7,692
Breeze produced	pounds	258
Coke produced	per cent.	64.10
Breeze produced	per cent.	2.15
Total percentage yield		66.25

Remarks.—Dull-gray color; slightly silvery. Light weight. Poor, dense coke.

Test 83, West Virginia No. 19.—Size as shipped, run of mine. Size as used, finely crushed. Raw. Duration of test, 53 hours.

Coal charged	pounds	12,000
Coke produced	pounds	7,914
Breeze produced	pounds	283
Coke produced	per cent.	65.95
Breeze produced	per cent.	2.36
Total percentage yield		68.31

Remarks.—Dull gray color, with slight silvery lustre; cell structure small. Much heavier and better than in test 79.

Analyses.

	Test 79.		Test 83.	
	Coal.	Coke.	Coal.	Coke.
Moisture	2.82	0.38	2.43	0.45
Volatile Matter	20.63	1.68	21.34	0.55
Fixed Carbon	70.30	89.96	70.50	91.57
Ash	6.25	7.98	5.73	7.43
Sulphur	1.00	0.77	0.96	0.82

Additional coking tests by the U. S. Fuel-Testing Plant at St. Louis, Mo., are given on pages 26, 35, and 44 of Bulletin 336 of the U. S. Geological Survey, as also cupola tests of coke on pages 52, 55, 58, 61, and 64 of the same Bulletin. They are too long for republication here.

Sugar Creek Coal & Coke Co. "Sugar Creek Mine No. 1"—No. 169 on Map II.

On north bank of Sugar Creek, ½ mile west of Macdonald: **Sewell Coal**; elevation, 1725′ B.; section by Teets, near drift mouth in main heading.

			Feet.	Inches.
Sandstone, massive, visible, medium-grained....			15	9
Slate, gray and sandy..........................			4	0
Coal, block........................	1′	6		
Coal, soft.........................	0	6		
Coal, block........................	2	7		
Coal, soft.........................	0	4	 4	11

Messrs. Brady and Edmonds collected a sample of coal from this mine, the analysis of which by Prof. Hite was published by Dr. White under No. 22 on pages 658 and 659 of Volume II of the Survey and republished by him under the same number on pages 211-212 of Volume II(A) and page 248 of Bulletin 2. This analysis is given under **Mine No. 169** in Table 1 at the end of this Chapter.

The bed was measured and sampled at three points by J. J. Rutledge and F. J. Simington, of the U. S. Geological Survey, on June 18, 1909, and at one point by A. J. Hazlewood, of the same Survey, on August 2, 1909, as given on page 932 of Bulletin 22 of the U. S. Bureau of Mines.

Section A (sample 7986) was cut from room 4 on air-course, about 1,200 feet west of drift mouth; thickness of bed and of coal sampled, 4′ 8½″.

Section B (sample 7996) was cut from face of entry 3, about 1,000 feet east of drift mouth; thickness of bed, 4′ 10″; thickness of coal sampled, 4′ 8″.

Section C (sample 7997) was cut from room 32, off left entry 4, about 2,400 feet west of drift mouth; thickness of bed, 5′ 3½″; thickness of coal sampled, 4′ 8½″.

Section D (sample 8598) was cut from face of room 14, off left entry 1, about 300 feet south of drift mouth; thickness of bed and of coal sampled, 4′ 9½″.

A composite sample was made by mixing samples 7986, 7996, and 7997 for an ultimate analysis, the results of which are shown under laboratory No. 8105.

These 5 analyses, as taken from pages 233 and 234 of Bulletin 22 of the U. S. Bureau of Mines, together with an air-dried calculation of the composite sample (No. 8105) as published by Dr. I. C. White under No. 20 on page 244 of Bulletin 2 of the W. Va. Geological Survey, are given under **Mine No. 169** in Table 3 at the end of this Chapter.

"Notes.—The coal at this mine was undercut in the bed, generally by hand, and was shot down with black powder. The tipple was equipped with bar screens 12 feet long with 1¼-inch openings, and with revolving screens 12 feet long, with ½-inch openings. The coal was picked on the car by four trimmers. The daily output at time of sampling in 1909 averaged 500 tons, and 600 tons was the capacity of the mine. Seventy-five per cent. of the future output was expected to come from pillars. Thickness, uniform, ranging as mined from 5 feet to 5 feet 6 inches; roof, strong gray shale; floor, hard gray shaly underclay."

Sugar Creek Coal & Coke Co. "Sugar Creek Mine No. 2"—No. 170 on Map II.

On south bank of Sugar Creek, ½ mile west of Macdonald; **Sewell Coal**; elevation, 1725′ B.; section by Teets 80 feet in air-course.

			Feet.	Inches.
Coal, block (slate roof)	1′	6″		
Coal, soft	0	5		
Coal, block	2	8		
Coal, soft	0	5	5	0

"This mine has always been run under the above name. Was opened about 1890. Principal office, Mt. Hope, W. Va.; used for domestic and steam purposes; shipped east to Newport News; number of men employed, 50 miners and 20 laborers; capacity, 400 to 500 tons daily; output, 400 tons daily; all pillar work; electric and rope haulage. C. H. Jones, Assistant Foreman, authority for mine data. The figures for men and output apply to Mines Nos. 1 and 2 (169 and 170)."

Mt. Hope Coal Co. Mine—No. 171 on Map II.

On north bank of Dunloup Creek, ¾ mile southwest of Macdonald; **Sewell Coal**; elevation, 1720′ B.; section by Teets, near mouth of main heading.

			Feet.	Inches.
Coal (sandstone roof)	2′	0″		
Slate	0	10		
Coal (slate floor)	2	4	5	2

"Principal office, Mt. Hope, W. Va.; established in 1902 and always has run under above name; used for domestic and steam purposes; shipped north, south, east, and west; electric haulage; output, 100 tons daily; capacity 450 tons daily; number of men employed, 14 miners and 8 laborers; A. D. Moseley, Superintendent, authority for mine data."

McKell Coal & Coke Co. "Kilsyth Mine"—No. 172 on Map II.

On south bank of Dunloup Creek, ¾ mile southwest of Macdonald; **Sewell Coal**; elevation, 1771′ B.; section by Teets, in main entry about 250 feet in.

			Feet.	Inches.
Coal, sulphurous (sandstone roof)..	0′	5″		
Coal	0	10		
Coal, bony................................	0	2		
Coal, gas, blocky (slate floor)......	2	9	4	2

"Principal office, Glen Jean; used for steam purposes; shipped east; output, 800 tons daily; capacity, 1,400 tons daily; number of men employed, 100 miners and 50 laborers; electric haulage; mine has been in operation about 20 years and has always operated under the above name; H. H. O'Neal, Superintendent, authority for mine data."

The analysis of a sample of coal collected by Messrs. Brady and Edmonds and analyzed by Prof. Hite was published by Dr. White under No. 23 on pages 658-9 of Volume II and republished by him under the same number on pages 211-212 of Volume II(A) and page 248 of Bulletin 2 of the Survey. This analysis is given under **Mine No. 172** in Table 1 at the end of this Chapter.

The bed was measured and sampled by H. M. Wolflin of the U. S. Geological Survey at one point on July 29, 1909; at three points on July 1, 1909, and at one point on July 3, 1909, as given on pages 926 and 927 of Bulletin 22 of the U. S. Bureau of Mines.

Section A (sample 8058) was cut from room 7 on right entry 13, about 3,000 south of west of drift mouth; thickness of bed and of coal sampled, 5′ 7¾″.

Section B (sample 8090) was cut from face of main entry 2, about 5,000 feet approximately southeast of drift mouth; thickness of bed, 6′ 5″; thickness of coal sampled, 5′ 10¾″.

Section C (sample 8095) was cut from face of left entry 14, about 4,500 feet approximately southeast of drift mouth; thickness of bed, 4′ 6¼″; thickness of coal sampled, 4′ 4¾″.

Section D (sample 8091) was cut from face of left entry 12, about 5,500 feet approximately southeast of drift mouth; thickness of bed and of coal sampled, 5′ 1¾″.

Section E (sample 8089) was cut from room 11 on dip 1, about 4,500 feet approximately southwest of drift mouth; thickness of bed, 6′ 4½″; thickness of coal sampled, 5′ 2¾″.

A composite sample was made by mixing samples 8058, 8089, 8090, 8091, and 8095, the results of which are shown under laboratory **No. 8163.**

These 6 analyses, as taken from page 231 of Bulletin 22 of the U. S. Bureau of Mines, together with an air-dried calculation of the composite sample (No. 8163), as published by Dr. White under No. 10 on page 244 of Bulletin 2 of the W. Va. Geological Survey, are given under **Mine No. 172** in Table 3 at the end of this Chapter.

"Notes.—The coal from this mine, like that from many others in the field, is for the most part soft and friable. It was undercut almost entirely by hand, there being only one mining machine at the mine. It was shot down with a permissible explosive. The tipple had bar screens with 1-inch, 2-inch, and 3-inch openings. The estimated daily output at the time of sampling was about 2,000 tons; about 2,600 tons was the capacity of the mine. The immediate future output was to be derived from both advance work and pillars. Thickness, not very uniform, ranging as mined from 4 feet 6 inches to 6 feet 4 inches; roof, generally a hard, blue, clay shale, sometimes cut out by sandstone; between this main roof and coal there is a draw slate 2 inches to 6 inches thick, which falls with the coal; floor, hard, shaly clay, with smooth surface."

Whiteoak Fuel Co. "Sherwood" Mine—(Abandoned)—No. 173 on Map II.

On west bank of Dunloup Creek, 1.2 miles southwest of Macdonald; **Sewell Coal**; elevation, 1665′ B.; shaft mine, 110 feet in depth; section by author as published by Dr. I. C. White on page 206 of Volume II(A).

				Feet.	Inches.
1.	Slate, poor roof				
2.	**Coal**, soft	1′	1″		
3.	Slate, black	0	4		
4.	**Coal**, soft	0	5		
5.	**Coal**, soft, "mining"	0	4		
6.	**Coal**, soft	3	9	5	11
7.	Fire clay				

"Greatest rise, S. 40° E.; Butts, east and west; faces, north and south; mine capacity, 200 tons; men employed, 66; sample from Nos. 4, 5, and 6, the analysis of which was published under No. 12 in Table No. 2, pages 214-215 of Volume II(A); coal shipped mostly to tidewater for steam; authority for mine data, H. H. Pinkney, Superintendent."

"The coal above the black slate No. 3 is not taken down, although apparently very good."

At the time of sampling this mine, it was owned by the Price Hill Coal Company.

The bed was measured and sampled at two points by F. J. Simington of the U. S. Geological Survey on June 16, 1909, as given on pages 939-940 of Bulletin 22 of the U. S. Bureau of Mines.

Section A (sample 7989) was cut from face of main west entry, about 3,500 feet southwest of shaft; thickness of bed and of coal sampled, 3′ 5″.

Section B (sample 7990) was cut from face of left entry 5, about 2,500 feet southwest of shaft; thickness of bed, 3′ 8¼″; thickness of coal sampled, 3′ 7¾″.

A composite sample was made by mixing samples 7989 and 7990 for an ultimate analysis, the results of which are shown under laboratory **No. 8292.**

These 3 analyses, as taken from page 237 of Bulletin 22 of the U. S. Bureau of Mines, together with an air-dried calculation of the composite sample (8292) as published by Dr. White under No. 12 on page 241 of Bulletin 2 of the W. Va. Geological Survey, are given under **Mine No. 173** in Table 3 at the end of this Chapter.

"**Notes.**—The coal was undercut by hand in the bed. Thickness, as mined, about 2 to 4 feet; roof, treacherous shale, between which and the coal there is often several inches of bony coal; floor, shaly underclay."

Coal Opening (Abandoned)—No. 476 on Map II, on Barren Branch of Dunloup Creek, 0.7 mile due south of Harvey, in the **Sewell Coal,** at an elevation of 1760′ B., had fallen shut and was abandoned

New River Coal & Coke Co. No. 3 Opening (Abandoned)—No. 477 on Map II, on Barren Branch, east side of road, 1.3 miles N. 65° E. of Dunloup, in the **Sewell Coal,** at an elevation of 1780′ B., had fallen shut and was abandoned.

New River Coal & Coke Co. Coal Opening—No. 478 on Map II, on north side of road on Mill Creek, 0.8 mile S. 25° E. of Macdonald, in the **Sewell Coal,** at an elevation of 1925′ B., is an old break through from "Macdonald" Mine (No. 168 on Map II).

Wm. McKell Coal Opening—No. 479 on Map II.

On west hillside of New River, 0.8 mile N. 60° W. of McKendree; **Sewell Coal**; elevation, 2520′ B.; section by Teets.

			Feet.	Inches.
Sandstone, massive, rather coarse			5	0
Coal, bony	0′	6″		
Coal, gas, block (slate floor)	4	4	4	10

Wm. McKell Coal Opening—No. 480 on Map II.

On east side of ridge road, 1.6 miles S. 70° W. of McKendree; **Sewell Coal**; elevation, 2420′ B.; section by Teets.

			Feet.	Inches.
Sandstone, massive, visible			10	0
Coal, impure	0′	6″		
Coal, block (slate floor)	4	5	4	11

Morris Martin Coal Opening—No. 481 on Map II.

On west side of ridge road near County Line, 2.2 miles S. 65° W. of McKendree; **Sewell Coal**; elevation, 2380′ B.

			Feet.	Inches.
Sandstone, massive, medium-grained, visible			15	0
Coal, bony	0′	6″		
Coal (slate floor)	4	4	4	10

Miller Local Mine Opening—No. 482 on Map II.

On northwest hillside of New River, 0.6 mile N. 30° W. of Terry; **Sewell Coal**; elevation, 2355′ B.; butts, N. 40° W.; faces, N. 50° E.; section by Teets, as published by C. E. Krebs under Mine No. 387 on page 497 of the Raleigh County Report of W. Va. Geological Survey.

			Feet.	Inches.
Coal, gas (with shale roof)	1′	4″		
Shale, gray	1	5		
Coal, block, columnar (to slate floor)	1	10	4	7

New River & Pocahontas Consolidated Coal Co. "Weirwood Shaft"—No. 174 on Map II.

On east hillside of Paint Creek, 0.3 mile north of Herberton; Sewell Coal; elevation, 1710' L.; section by A. M. Hagan at main south heading 4,000 feet from shaft; depth of shaft, 340 feet.

				Feet.	Inches.
1.	Slate roof				
2.	**Coal**, good	1'	8"		
3.	Slate, 0" to	0	1		
4.	**Coal**, with little partings	2	4	4	1
5.	Slate floor				

"Principal office, Charleston, W. Va., H. M. Bertolet, General Manager; general office, Commercial Trust Building, Philadelphia, Pa.; output now only 140 to 150 long tons daily, just driving heading (1915); started up in July, 1914; daily capacity (1918), 3,000 tons; men employed in 1915, 65 inside and 15 outside; shipped east to tidewater for steam purposes; electrically equipped in every way, including pumps; electricity from Cabin Creek Plant; butts, east; faces, south; authority for mine data, W. I. McPheeters, Bookkeeper, and A. F. Marshall, Superintendent."

The analysis of a sample (943H) collected by Mr. Hagan from Nos. 2 and 4 of section, as reported by Messrs. Hite and Krak, is given under **Mine No. 174** in Table 1 at the end of this Chapter.

Mr. C. E. Krebs published a section of the coal at this mine under No. 12 on page 493 of the Raleigh County Report of the Survey, as follows:

			Feet.	Inches.
Coal, gas (with slate roof)	2'	2"		
Bone	0	2		
Coal, gas (to slate floor)	1	8	4	0

Also, on page 308 of the same Report, under No. 198, Mr. Krebs gives the thickness of the Sewell Coal as 3' 10". The depth of the shaft reported (315' 8") on the latter page, however, is in error, the correct depth being given on page 493 (340 feet).

Sewell Mountain District.

Sewell Mountain District ranks third to Fayetteville and Nuttall Districts in available tonnage of Sewell Coal. The latter has long been mined commercially in the area first mentioned along the New River front and on Manns Creek, near Clifftop. It has also been prospected extensively on the slopes of Walnut Ridge by natives for local domestic fuel and by the New River & Pocahontas Consolidated Coal Co., where it attains a fine development. Its thickness and stratigraphic position are exhibited in the sections published in Chapter IV for Mouth of Manns Creek, Sewell—0.9 Mile South, Beury, Ravenseye, Corliss—1 Mile North, Rader Ford, Maywood—Aldrich Camp, and Sims Schoolhouse, page references to which are given in the Index; and in the logs of Coal Test Borings Nos. 91, 93, 93B, 93C, 93D, and 94 on Map II, also referenced in Index. It appears to attain minable development over practically the entire area indicated for it on Figure 20, page 678. Its description at the commercial mines, prospect openings, and other exposures follows.

Longdale Iron Co. "Sewell Mine"—No. 175 on Map II, on east hillside of New River, 0.3 mile east of Sewell, in the **Sewell Coal,** at an elevation of 1950′ B., was mined out 12 to 15 years ago. It is used in the Sewell—0.9 Mile South Section, page 198.

The analysis of a sample of coke collected at the above mine by Messrs. A. P. Brady and R. W. Edmonds, as reported by Prof. Hite and published by Dr. I. C. White under No. 2 on pages 663-4 of Volume II and republished by him under the same number on page 214 of Volume II(A) and page 249 of Bulletin 2 of the Survey, is given under **Mine No. 175** in Table 2 at the end of this Chapter.

Coal Opening—No. 483 on Map II, in the edge of ridge road, 1 mile west of Beury, in the Sewell Coal, at an elevation of 1875′ B., as determined by the author, was closed and thickness not learned.

Beury Bros. Coal & Coke Co. (Abandoned) Mine—No. 176 on Map II.

On south hillside of New River, 0.6 mile S. 70° W. of Beury; **Sewell Coal**; elevation, 1910′ B.; used in Beury Section, page 199; closed and abandoned; mined out for 4 or 5 years; originally was Wm. Beury-Cooper & Co., then changed to Echo Coal & Coke Co.; from June, 1903, until abandoned, run under Beury Bros. Coal & Coke Co.; examined by author.

Beury Bros. Coal & Coke Co. "Echo Mine"—No. 177 on Map II.

On east hillside of branch of New River, 0.7 mile S. 10° E. of Beury; **Sewell Coal**; elevation, 2080′ B.; operating 1 year in 1915; section by author.

			Feet.	Inches.
Sandstone roof				
Coal, soft, columnar	4′	3″		
Coal, bony, "mother" streaks	0	8	4	11

Capacity of mine 250 tons daily of 9 hours; shipped east for steam purposes; men employed, 42 inside and outside; authority, W. L. McDaniel, Foreman.

Ballinger Coal Co. Drift Opening—No. 178 on Map II.

On head of Road Fork of Brackens Creek, 2.1 miles S. 45° E. of Winona; **Sewell Coal**; elevation, 2415′ B.; section by author.

			Feet.	Inches.
Slate, black, cannel			3	0
Coal, bony	0′	10″		
Coal, good (slate floor)	3	6	4	4

Keeneys Creek Colliery Co. "Brackens Creek Mine"—No. 179 on Map II, on east bank of Road Fork of Brackens Creek, 2.4 miles S. 70° E. of Winona, in the **Sewell Coal**, at an elevation of 2205′ B., as determined by the author, is an extension of Mine No. 121 on Map II via Opening No. 462 on Map II, the bed here being 3½ to 4 feet in thickness.

Chas. Middleburg Coal Opening—No. 484 on Map II, on ridge, 1.6 miles N. 75° W. of Clifftop, in the **Sewell Coal**, at an elevation of 2515′ B., as determined by the author, was closed but 3 feet of clean, soft coal in top portion was exposed and is reported by D. E. Peters to be 4 feet in thickness.

Chas. Middleburg Coal Opening—No. 485 on Map II, on west side of ridge, 1.9 miles N. 75° W. of Clifftop, in the **Sewell Coal,** at an elevation of 2500′ B., as determined by the author, was closed; bed reported by D. E. Peters to have a thickness of 3 to 4 feet.

Chas. Middleburg Coal Opening—No. 486 on Map II, on ridge, and axis of Mann Mountain Anticline, 1.8 miles N. 80° W. of Clifftop, in the **Sewell Coal,** at an elevation of 2570′ B., as determined by the author, was closed, but the bed is reported by David E. Peters, a native, only 6 feet below summit of flat hill, with thickness of 4 feet.

Brackens Creek Coal & Land Co. Opening—No. 487 on Map II.

In ravine south side of road, 2.1 miles N. 5° E. of Clifftop; **Sewell Coal**; elevation, 2185′ B.; examined by author.

	Feet.	Inches.
Coal, opening closed, reported by Wm. H. Taylor to have a thickness of	0	8

Digging does not appear to have been driven far enough under cover to get full height of bed. Roof is concealed, but comes directly over 5 feet of heavy sandstone (visible).

Brackens Creek Coal & Land Co. Prospect—No. 488 Map II.

On east hillside of Brackens Creek, 2 miles southwest of Russellville; **Sewell Coal**; elevation, 2010′ B.; examined by author.

			Feet.	Inches.
Shale, buff, sandy, visible			4	0
Coal, medium-soft	1′	9″		
Shale, black, hard, sandy, 15″ to	1	1		
Coal, soft (slate, black, floor)	1	3	4	1

Coal Prospect—No. 489 on Map II.

On west hillside of Meadow River, 0.9 mile southeast of Russellville; **Sewell Coal**; elevation, 2115′ B.; examined by author.

			Feet.	Inches.
Concealed				
Slate, black, bituminous	0′	5″		
Coal, medium-soft (shale, gray, floor)	0	10	1	3

Gilpin Coal Opening—No. 490 on Map II.

On west hillside of Meadow River, 1.2 miles southeast of Russellville; **Sewell Coal**; elevation, 2170′ B.; examined by author.

	Feet.	Inches.
Coal, opening closed, reported by Mrs. Gilpin....	1	6

Coal Exposure—No. 491 on Map II, on west hillside of Meadow River, 1.5 miles southeast of Russellville, of the Sewell Coal, at an elevation of 2275′ B., examined by author, is represented only by its blossom in road, thickness not determined.

Clyde Jones Coal Opening—No. 492 on Map II.

On west hillside of Meadow River, 2¼ miles southeast of Russellville; **Sewell Coal**; elevation, 2450′ B.; for stratigraphic position see Corliss—1 Mile North Section, page 201.

	Feet.	Inches.
Coal, "peacock," clean, bright..................	1	8

A. W. Ashley Coal Opening—No. 184 on Map II.

On east side of road, ½ mile N. 10° W. of Corliss; **Sewell Coal**; elevation, 2575′ B.; section and sample by author.

				Feet.	Inches.
1.	Shale, sandy, visible.......................			5	0
2.	Cannel slate..................................			0	7
3.	**Coal**, soft......................	1′	6″		
4.	**Coal**, slaty, 2″ to (slate floor)..	0	3	1	9

The analysis of a sample (919H) collected from No. 3 of above section, as reported by Messrs. Hite and Krak, is given under **Mine No. 184** in Table 1 at the end of this Chapter.

A. W. Ashley Coal Opening—No. 493 on **Map II**, on north hillside of Laurel Creek, 1 mile S. 40° E. of Corliss, in the Sewell Coal, at an elevation of 2590′ B., as determined by the author, was closed, but coal is reported by Mr. Ashley to be 18 to 24 inches in thickness.

Coal Opening—No. 494 on **Map II**, on north hillside of Laurel Creek, west edge of hill road, 1.1 miles S. 45° E. of Corliss in the Sewell Coal, at an elevation of 2585′ B., as determined by the author, was closed, but coal is reported by A. W. Ashley to be 2 feet in thickness.

Meadow River Lumber Co. Coal Opening—No. 185 on Map II.

On east hillside of branch of Laurel Creek, 1.7 miles S. 30° W. of Corliss; **Sewell Coal**; elevation, 2610′ B.; section and sample by author.

	Feet.	Inches.
Slate, black, sandy, visible	2	0
Coal, soft (slate, gray, floor)	1	10

The analysis of a sample (920H) collected at the above mine, as reported by Messrs. Hite and Krak, is given under **Mine No. 185** in Table 1 at the end of this Chapter.

George Wright Coal Opening on Meadow River Lumber Co.— No. 495 on Map II.

On south bank of Laurel Creek, 2 miles S. 15° W. of Corliss; **Sewell Coal**; elevation, 2645′ B.; section by author.

			Feet.	Inches.
Slate, black, sandy, roof				
Coal, soft	1′	8″		
Coal, slaty (slate, gray, floor)	0	4	2	0

Coal Exposure—No. 496 on Map II.

In road, 0.6 mile N. 85° W. of Clifftop; **Sewell Coal**; elevation, 2340′ B.; examined by author.

	Feet.	Inches.
Coal, soft, visible, top poor	1	3

Babcock Coal & Coke Co. No. 4 Drift—No. 180 on Map II.

On south hillside of Manns Creek, 0.5 mile southwest of Clifftop; **Sewell Coal**; elevation, 2400′ B.; section and data by author.

			Feet.	Inches.
Slate				
Draw slate			0	8
Coal, soft	0′	2½″		
Coal, bony	0	2½		
Coal, soft	3	1		
Slate, gray, **coal** streaks	0	4	3	10
Slate, gray				

"Principal office, Pittsburgh, Pa. E. V. Babcock, President; capacity, 150 tons from each mine, No. 4 and No. 3; men employed at both Mines Nos. 3 and 4, 60 inside and 15 outside; all coal is coked at Sewell; mine opened 7 years ago; W. L. Herndon, Superintendent, authority for mine data. Coke shipped both east and west for both blast-furnace and foundry purposes; good reputation."

Babcock Coal & Coke Co. ("Clifftop") Drift No. 1—No. 181 on Map II.

On south hillside of Manns Creek, at Clifftop; **Sewell Coal**; elevation, 2330' B.; section by Messrs. Brady and Edmonds; correlation verified by author.

	Feet.	Inches.
Coal	2	10

The analysis of a sample of coal collected at the above mine by Messrs. Brady and Edmonds, as reported by Prof. Hite, and published by Dr. White under No. 18 on pages 658 and 659 of Volume II and republished by him under the same number on pages 211-212 of Volume II(A) and page 248 of Bulletin 2 of the Survey, is given under **Mine No. 181** in Table 1 at the end of this Chapter.

The above mine was opened in 1884 and was operated until 1913 by the Longdale Iron Company. This opening is now closed and abandoned.

Babcock Coal & Coke Co. Drift No. 3—No. 182 on Map II.

On south hillside of Manns Creek, 0.5 mile east of Clifftop; **Sewell Coal**; elevation, 2315' B.; section on rib, 250 feet in, by author.

			Feet.	Inches.
Shale, sandy, flaggy			3	0
Cannel bone..............	0'	8"		
Coal, soft, (slate floor).............	3	0	3	8

Along the main entry, driven S. 35° E., the coal rises at about 3 per cent., says Mr. W. L. Herndon, Superintendent. See Mine No. 180 for data concerning this mine.

Babcock Coal & Coke Co. (Abandoned) **Drift No. 2—No. 183 on Map II**, on southeast hillside of Manns Creek, 3/4 mile northeast of Clifftop, in the **Sewell Coal**, at an elevation of 2310' B., as determined by the author, was opened 25 years ago and is now closed and abandoned.

Coal Exposure—No. 497 on Map II.

On north hillside of Manns Creek, at road fork, 1.2 miles N. 65° E. of Clifftop; **Sewell Coal**; elevation, 2320′ B.; examined by author.

	Feet.	Inches.
Coal, visible at edge of road, 3′ 0″ to	4	0

Coal Exposure—No. 498 on Map II.

In road, 0.8 mile northwest of Ravenseye; **Sewell Coal**; elevation, 2405′ B.; examined by author.

	Feet.	Inches.
Coal, in edge of road, 3′ 0″ to	4	0
Slate, dark, visible	30	0

Coal Exposure—No. 499 on Map II.

In hill road, 0.2 mile northwest of Ravenseye; **Sewell Coal**; elevation, 2525′ B.; examined by author.

	Feet.	Inches.
Coal blossom, visible	1	0

Chas. M. Amick Coal Opening—No. 500 on Map II.

On east hillside of Manns Creek, 0.1 mile southwest of Ravenseye; **Sewell Coal**; elevation, 2660′ B.; examined by author.

	Feet.	Inches.
Coal, medium-soft (slate roof)	2	9
Slate, black, pavement		

J. L. Beury Coal Opening—No. 501 on Map II.

On east hillside of Manns Creek, 0.1 mile southwest of Ravenseye; **Sewell Coal**; elevation, 2660′ B.; examined by author.

	Feet.	Inches.
Coal, opening closed, reported by E. R. Douglas, clean, soft, with thickness of	2	6

Opening formerly supplied domestic fuel for the region.

Nuttall Estate Coal Opening—No. 502 on Map II.

On north hillside of Manns Creek, 1.5 miles S. 55° E. of Ravenseye; **Sewell Coal**; elevation, 2645′ B.; opening closed and section by E. R. Douglas; correlation by author.

			Feet.	Inches.
Coal, bony (slate roof)	0′	2″		
Coal, soft (slate floor)	1	7	1	9

Coal Digging—No. 503 on Map II, on east hillside of Manns Creek, 2 miles S. 35° E. of Ravenseye in the Sewell Coal, at an elevation of 2650′ B., as determined by the author, was closed, but the bed is reported clean and 18 inches in thickness by E. R. Douglas.

Dr. John W. Walker Coal Digging—No. 504 on Map II, on east hillside of Manns Creek, 0.1 mile southeast of Opening No. 503 on Map II, in the **Sewell Coal,** at an elevation of 2650′ B., as determined by the author, was closed and thickness of bed not learned.

Laviro Neff Coal Opening—No. 505 on Map II.

On south hillside of Manns Creek, east side of road, 0.9 mile S. 10° E. of Ravenseye; **Sewell Coal**; elevation, 2660′ B.; examined by author.

		Feet.	Inches.
Shale, dark, sandy, visible		3	0
Coal, bony	0′ 4″		
Coal, soft (slate pavement)	2 1	2	5

A. W. McClung Coal Opening—No. 506 on Map II.

On head of branch of Meadow River, 2 miles N. 55° W. of Rainelle; **Sewell Coal**; elevation, 2920′ B.; section by author.

	Feet.	Inches.
Sandstone, grayish-white, visible	3	0
Coal, soft, columnar (slate floor)	2	0

E. S. Crookshank Coal Prospect—No. 507 on Map II, on west side of road, ¼ mile south of Eureka Schoolhouse, 1½ miles northwest of Rainelle, in the **Sewell Coal,** at an elevation of 3030′ B., as determined by the author, was closed, but is reported by Mr. Crookshank to be 10 inches in thickness and cannelly.

Coal Opening—No. 508 on Map II, on east hillside of Floyd Creek, 0.6 mile due south of Clifftop, in the **Sewell Coal,** at an elevation of 2410′ B., as determined by the author, was closed and the thickness of bed not learned.

Coal Opening—No. 509 on Map II, on waters of Floyd Creek, 1 mile N. 20° E. of Landisburg, at an elevation of

2610′ B., as determined by the author, is in the Sewell bed, but its thickness was not obtained.

G. T. Smails Coal Opening—No. 510 on Map II, on north hillside of Laurel Creek, 1.1 miles due east of Landisburg, in the **Sewell Coal,** at an elevation of 2720′ B., as determined by the author. Coal is reported by David Smith, 2′ 4″ to 2′ 6″ in thickness.

David Smith Coal Opening—No. 511 on Map II.

On south hillside of Laurel Creek, 0.9 mile southeast of Landisburg; **Sewell Coal**; elevation, 2720′ B.; section by author.

	Feet.	Inches.
Shale, dark, siliceous, visible	4	0
Coal, soft (slate floor)	2	4

Ben Sycafoose Coal Opening—No. 186 on Map II.

On south side of Laurel Creek, 0.3 mile S. 55° E. of Pittman; **Sewell Coal**; elevation 2655′ B.; section taken 100 feet in by author.

				Feet.	Inches.
1.	Slate roof				
2.	**Coal**, bony	0′	3″		
3.	**Coal**, soft, (slate floor)	2	8	2	11

The analysis of a sample (928H), collected by the author from No. 3 of the above section, as reported by Messrs. Hite and Krak, is given under **Mine No. 186** in Table 1 at the end of this Chapter.

Jos. M. Critchley Coal Opening—No. 512 on Map II.

On south hillside of Laurel Creek, 1 mile east of Pittman; **Sewell Coal**; elevation, 2685′ B.; examined by author.

	Feet.	Inches.
Coal (with no bone) reported by G. A. Shuck	2	6

T. A. Shuck Coal Opening—No. 513 on Map II.

On north hillside of Laurel Creek, 1.5 miles northeast of Pittman; **Sewell Coal**; elevation, 2665′ B.; examined by author.

	Feet.	Inches.
Coal, opening closed, with 4″ of bone at top, reported by G. A. Shuck	1	6

T. A. Shuck Coal Opening—No. 514 on Map II.

On branch of Glade Creek, 1¾ miles N. 10° E. of Danese; **Sewell Coal**; elevation, 2680' B.; driven in about 100 feet and furnishes local fuel; examined by author.

			Feet.	Inches.
Shale, blue, sandy, visible			6	0
Coal, bony	0'	3"		
Coal, medium-hard	0	4		
Slate, hard, sandy, dark	0	3		
Coal, soft (slate, gray, floor)	2	1	2	11

John Andrew Shuck Coal Opening—No. 515 on Map II.

On branch of Glade Creek, 2 miles N. 25° E. of Danese; **Sewell Coal**; elevation, 2700' B.; on land of New River and Pocahontas Consolidated Coal Company; driven in only 10' to 15' examined by author.

			Feet.	Inches.
Shale, bluish-black, sandy, visible			4	0
Coal, soft	0'	4½"		
Bone, 0" to	0	1½		
Coal, soft (shale, dark-gray, floor)	1	11	2	5

Edward D. Thomas Coal Prospect—No. 516 on Map II, on southeast side of knob, 0.8 mile N. 50° E. of Danese, in the **Sewell Coal**, at an elevation of 2757' L., as determined by the author, was closed, but reported 18 to 24 inches in thickness.

New River & Pocahontas Consolidated Coal Co. Prospects in Sewell Coal.

(Closed or thickness of bed not learned).

No. on Map II.	Elevation above sea-level	Location.
517	2744' L.	On north side of knob, 1 mile N. 40° E. of Danese.
518	2738' L.	On west side of knob, 0.4 mile N. 40° E. of Danese.
521	3044' L.	On north side of knob, 2.5 miles due N. of Gentry.
522	3104' L.	On northwest side of knob, 0.4 mile southwest of No 521.
523	3115' L.	On south side of knob, 1.9 miles N. 5° W. of Gentry.
525	2843' L.	On head of branch of Burnt Creek, 2 miles S. 70° W. of Danese.
526	2892' L.	On west slope of Walnut Knob, 0.9 mile N. 40° E. of Gentry.
527	2910' L.	On west slope of Walnut Knob, 0.7 mile N. 50° E. of Gentry.
530	2997' L.	On branch of Pole Creek, 1.5 miles S. 55° E. of Danese.

Leslie Kincaid Coal Opening—No. 519 on Map II.

On northwest side of road, 1.4 miles due south of Landisburg; **Sewell Coal**; elevation, 2815′ B.; section on rib 5 feet in, by author.

			Feet.	Inches.
Shale, dark, and buff, visible			1	0
Coal, soft	0′	4″		
Coal, gray, harder	0	6		
Coal, soft (slate, dark, floor)	2	2	3	0

John Meadows Coal Opening—No. 520 on Map II.

On north edge of road, 1.8 miles due north of Gentry; **Sewell Coal**; elevation, 3028′ L.; examined by author.

			Feet.	Inches.
Shale, buff and dark, visible			5	0
Coal, bony cannel	0′	5″		
Coal, medium-hard, with "peacock" lustre	0	3		
Coal, gray, hard	1	0		
Coal, soft, (slate, black floor)	2	2	3	10

John F. Anderson Coal Opening—No. 524 on Map II.

On head of Terry Branch, 2.1 miles S. 50° W. of Danese; **Sewell Coal**; elevation, 2815′ L.; section by author.

			Feet.	Inches.
Shale, dark, visible			5	0
Coal, soft	0′	2″		
Coal, gray, hard	0	8		
Coal, soft (slate, black, floor)	2	0	2	10

Coal Prospect—No. 528 on Map II, on south slope of Walnut Knob, northeast side of road, 0.8 mile due east of Gentry, in the **Sewell Coal,** at an elevation of 2908′ L., as determined by the author, was closed and thickness of coal not learned.

Coal Exposure—No. 529 on Map II.

In hill road, 0.3 mile southeast of Ebenezer Schoolhouse; 1.4 miles due south of Danese; **Sewell Coal**; elevation, 2885′ B.; examined by author.

	Feet.	Inches.
Coal blossom, 2′ 0″ to	3	0

Coal Prospect—No. 531 on Map II, on head of branch of Pole Creek, 1.9 miles S. 55° E. of Danese, in the **Sewell Coal**, at an elevation of 3039′ L., examined by the author, was closed and the thickness of coal not learned.

New River & Pocahontas Consolidated Coal Co. Opening—No. 532 on Map II.

On northwest slope of Ford Knob, just east of trail, 1.9 miles S. 80 E. of Danese; **Sewell Coal**; elevation, 3065′ B.; section by author.

			Feet.	Inches.
Shale, buff and dark			13	0
Coal, bony	0′	3″		
Coal, soft	0	7		
Slate, bony, hard, siliceous	0	5		
Coal, soft (slate floor)	0	11	2	2

Quinnimont District.

In Quinnimont District, the Sewell Coal, as shown on Figure 20 and Map II, is confined to several scattered patches, mostly along the northern border, high up near the ridge summits. It has been prospected quite extensively on the south slope of Walnut Ridge by the New River & Pocahontas Consolidated Coal Company, but in 1916, these diggings had practically all fallen shut. The bed is believed, however, to attain practically the same development as in Sewell Mountain District. The four following listed prospect openings in the Sewell Coal are all within the limits of Quinnimont District:

New River and Pocahontas Consolidated Coal Co. Prospects in Sewell Coal.

(Closed or thickness of coal not obtained).

No. on Map II.	Elevation above sea-level	Location.
533	3012′ L.	On south side of Walnut Ridge, 1.3 miles N. 55° E. of Crickmer.
534	2973′ L.	On south side of Walnut Ridge, 0.8 mile northeast of Crickmer.
535	2901′ L.	On south side of Walnut Ridge, 0.6 mile N. 50° W. of Crickmer.
536	2929′ L.	On south side of Walnut Ridge, west edge of hill road, 0.9 mile N. 80° W. of Crickmer.

Quantity of Sewell Coal Available.

Based on all the evidence in hand and a planimetric determination by A. M. Hagan of the area from Map II as limited on Figure 20, the following estimate is made by the author for the probable amount of Sewell Coal in Fayette County:

Probable Amount of Sewell Coal.

District.	Thickness of Coal Assumed. Feet.	Square Miles.	Acres.	Cubic Feet of Coal.	Short Tons of Coal.
Falls	2.5	36.68	23,475.2	2,556,449,280	102,257,971
Mountain Cove.....	2.5	28.89	18,489.6	2,013,517,440	89,540,698
Fayetteville	3.5	109.47	70,060.8	10,681,469,568	427,258,783
Nuttall	3.0	53.18	34,035.2	4,447,719,936	177,908,797
Sewell Mountain...	3.5	43.71	27,974.4	4,264,977,024	170,599,081
Quinnimont	3.5	2.21	1,414.4	215,639,424	8,625,577
Totals for county.......		274.14	175,449.6	24,179,772,672	967,190,907

THE FIRE CREEK COAL.

The Fire Creek Coal, described briefly in Chapter VII, pages 319-320, ranks fourth in Fayette in economic importance and available tonnage among the 20 separate minable coal beds within the County. Its approximate minable area is shown on Figure 21, as also the northwest boundary line, northwest of which the bed has apparently thinned below minable development. Its detailed outcrop is exhibited on Map II. Like the Sewell bed, it has long been mined commercially in Fayette where it yields a coal of great excellence for coking, steam, and domestic fuel purposes. The following average results compiled by R. C. Tucker from 35 different analyses of samples collected mostly in Fayette and Raleigh Counties, details of which were published in previous State Survey Reports, give a fair idea of its composition and calorific value:

		Per cent.
Moisture		0.72
Volatile Matter		18.40
Fixed Carbon		76.17
Ash		4.71
Total		100.00
Sulphur		0.66
Phosphorus		0.018
Calorimeter B. T. U.	15,014	

For special analyses the reader is referred to Tables Nos. 1 and 3 at the end of this Chapter.

Falls, Mountain Cove, Kanawha and Nuttall Districts.

In these four Districts, the Fire Creek Coal, in minable development, appears to be missing as shown on Figure 21, a feature that is determined largely from the results found in the logs of test wells for oil, gas, and coal at widely scattered points within their borders.

The thickness and stratigraphic position of the Fire Creek Coal are exhibited in the Kingston Section, page 169; in the logs of test wells for oil and gas Nos. 11, 12, and 15 on Map II, published on pages 350, 352, and 353, respectively; and in the log of Coal Test Boring No. 15 on Map II, page 402, for Kanawha District; and for Nuttall District, in the Russellville Section, page 177.

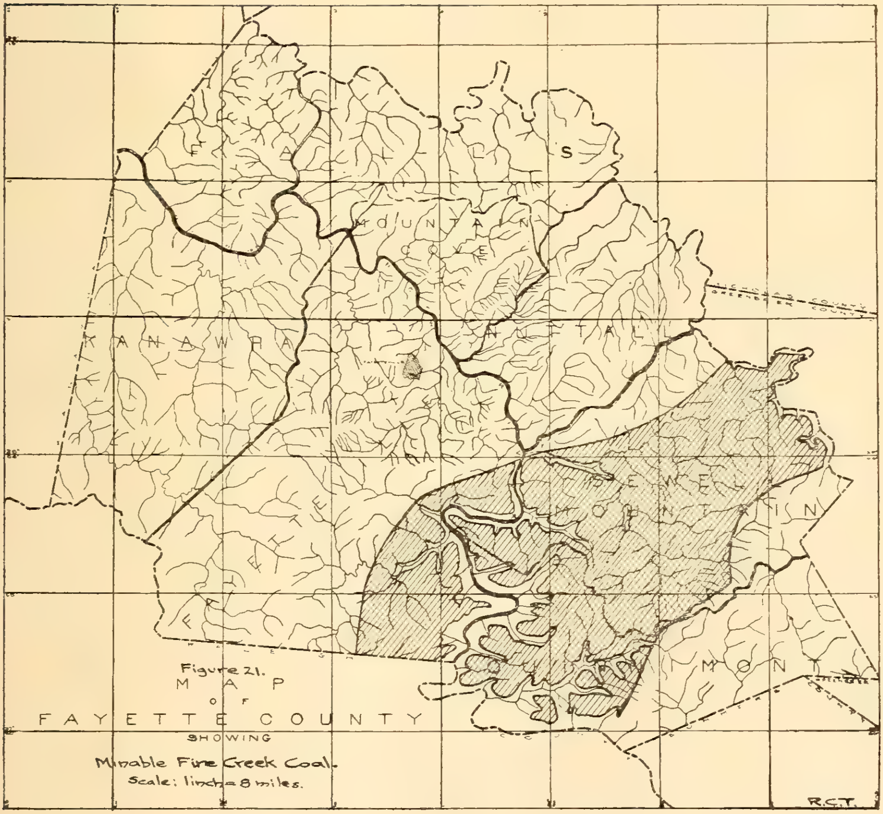

Figure 21.
MAP
OF
FAYETTE COUNTY
SHOWING
Minable Fire Creek Coal.
Scale: 1 inch = 8 miles.

Fayetteville District.

In Fayetteville District, the Fire Creek Coal in minable development appears to be confined to the southeastern border, as shown on Figure 21. Its thickness and stratigraphic position are exhibited in the South Fayette Station Section, page 182; and in the logs of Coal Test Borings Nos. 41, 42, 45, 46, 50, 58, 66, and 79B on Map II, page references to which are given in the Index. This coal has long been operated commercially within the borders of this District, a total of seven mines having been opened. Its description at these mines and at prospect openings follows.

Scotia Coal Co. "Red Ash Mine" (Abandoned)—
No. 187 on Map II.

On north hillside of New River, ½ mile northwest of Beury; **Fire Creek Coal**; elevation, 1500′ B.; examined by author.

	Feet.	Inches.
Coal, 4′ 9″ to	7	0

Old mine. Has just been abandoned. Balance of coal to be taken out at "Rush Run Mine," No. 188 on Map II.

The bed was measured and sampled at three points by R. Y. Williams, of the U. S. Geological Survey, on July 3, 1909, as given on pages 955 and 956 of Bulletin 22 of the U. S. Bureau of Mines.

Section A (**sample 8070**) was cut from the face of cross entry 1, off left entry 10, 1½ miles from drift mouth; thickness of bed and of coal sampled, 4′ 9″.

Section B (**sample 8071**) was cut from a pillar of room 1 on left entry 7, 1¼ miles south of drift mouth; thickness of bed and of coal sampled, 5′ 4¼″.

Section C (**sample 8072**) was cut from the face of the coal, 1¼ miles southwest of the drift mouth; thickness of bed, 6′ 11¾″; thickness of coal sampled, 6′ 7″.

A **composite sample** was made by mixing both face and pillar samples 8070, 8071, and 8072 for an ultimate analysis, the results of which are shown under laboratory **No. 8108.**

These 4 analyses, as taken from page 244 of Bulletin 22 of the U. S. Bureau of Mines, together with an air-dried calculation of the ultimate analysis of composite sample

(8108) as published by Dr. White under No. 5 on page 235 of Bulletin 2 of the W. Va. Geological Survey, are given under **Mine No.** 187 in Table 3 at the end of this Chapter.

"Notes.—The coal at this mine was undercut both by hand and with chain machines in bottom part of bed, and was shot down with a short-flame explosive. The tipple had bar screens, with 3-inch and 1¼-inch spaces, and the screenings were coked in beehive ovens. The coal was picked on car. The estimated daily output was 450 tons, and 1,000 tons was the maximum day's run. The future output was to be derived from both advance work and pillars. Thickness, somewhat irregular, due to large rolls in the roof, ranging as mined from 4 feet 9 inches to 7 feet; roof, strong gray shale, which does not fall with the coal; floor, fairly hard clay, with smooth surface."

Scotia Coal Co. "Rush Run Mine"—No. 188 on Map II.

On north hillside of New River, at Rush Run, 1 mile northeast of Thurmond; **Fire Creek Coal**; elevation, 1500′ B.; examined by author.

	Feet.	Inches.
Coal, 4′ 7¼″ to...............................	5	7

The bed was measured and sampled at two points by K. M. Way, of the U. S. Geological Survey on September 12, 1907, as given on pages 954-5 of Bulletin 22 of the U. S. Bureau of Mines.

Section A (sample 5328) was measured in room 23 on right entry 8, 4,500 feet southwest of the drift mouth; thickness of bed, 5′ 2½″; thickness of coal sampled, 5′ 1″.

Section B (sample 5327) was measured in room 18 on right entry 10, 5,700 feet south of the drift mouth; thickness of bed and of coal sampled, 5′ 1½″.

The bed was also measured and sampled at three points by A. C. Ramsay of the same Survey on July 3, 1909, as given on page 955 of the Bulletin above mentioned.

Section A (sample 8096) was cut from the face of left entry 7; thickness of bed, 5′ 7″; thickness of coal sampled, 5′ 5½″.

Section B (sample 8097) was cut from the face of room 4 on right air-course 11, 5,000 feet from drift mouth; thickness of bed and of coal sampled, 4′ 7¼″.

Section C (sample 8100) was cut from a pillar on right entry 7, 3,500 feet from drift mouth; thickness of bed, 5′ 3⅜″; thickness of coal sampled 5′ 1⅜″.

A **composite sample** was made by mixing both face and pillar samples 8096, 8097, and 8100 for an ultimate analysis, the results of which are shown under laboratory **No. 8160.**

These 6 analyses, as taken from page 243 of Bulletin 22 of the U. S. Bureau of Mines, together with an air-dried calculation of the analysis of the composite sample (8160) as published by Dr. White under No. 9 on page 236 of Bulletin 2 of the W. Va. Geological Survey, are given under **Mine No. 188** in Table 3 at the end of this Chapter.

"Notes.—The coal at this mine was undercut both by hand and with chain machines, and was shot down with a short-flame explosive. The tipple had bar screens, with 3-inch and 1¼-inch spaces. The screenings were coked in beehive ovens. The coal was picked on the car. The daily output at time of sampling in 1909 averaged 300 tons, although the mine had a larger capacity. The future output was to be derived from both advance work and pillars in about equal proportions. At this mine the bed lies nearly flat and has an average thickness of about 5 feet. Roof, sandstone or strong gray shale which does not fall with the coal; floor, shale or hard underclay with smooth surface."

Two sections of the bed were also measured and sampled in the mine by J. S. Burrows of the U. S. Geological Survey in 1904, as reported on pages 943-4 of Bulletin 22 of the U. S. Bureau of Mines.

Sample 1176, measured in room 22, off right entry 9, showed 5 feet of clean coal, and **sample 1175,** measured in room 10, off left entry 10, showed 5½ feet of clean coal.

The analyses of these 2 samples of coal, together with an analysis of a car sample (1390) taken from 31 tons of run-of-mine coal, which were first published by the U. S. Geological Survey on page 55 of Bulletin 261 of that Survey, and later published in Professional Paper 48, page 254, and page 239 of Bulletin 22 of the U. S. Bureau of Mines, are given under **Mine No. 188** in Table 3 at the end of this Chapter.

"Notes.—The coal is classed among the 'smokeless' coals and is commercially known as a New River coal. The lump was mostly shipped for steam purposes to large cities having smoke ordinances; some was exported, and a small percentage was used for domestic purposes. Most of the slack was coked at the mine. The output of the mine in 1904 was 800 to 1,000 tons daily, most of which went to large cities in the East and Middle West. The coal is of fine quality, but the bed is exceedingly irregular in thickness. In the Rush Run mine the coal bed ranges from a few inches to 7 or 8 feet in thickness. The bed lies nearly horizontal and is worked by drifts from the outcrop."

"For results of tests of this coal see mention of specific tests as follows—steaming tests: U. S. Geol. Survey of Prof. Paper 48, p. 857; Bull. 261, p. 82; Bureau of Mines Bull. 23, p. 69; briquetting tests: U. S. Geol. Survey Prof. Paper 48, p. 1450; Bull. 261, p. 165; coking tests: U. S. Geol. Survey Prof. Paper 48, p. 1359; Bull. 261, p. 128; cupola tests of coke: U. S. Geol. Survey Prof. Paper 48, pp. 1381, 1382.

"For chemical analyses see part I of this Bulletin (22, U. S. Bureau of Mines), p. 239; also U. S. Geol. Survey Prof. Paper 48, p. 254; Bull. 261, p. 55."

The following remarks concerning the Rush Run Mine are taken from page 128 of Professional Paper 48 of the U. S. Geological Survey:

"**Equipment and use.**—The Rush Run mine is located several hundred feet above railroad grade. From the drift mouth the loaded cars are lowered to the tipple over a steep inclined plane 1,000 feet long. The descent of the loaded cars brings an equal number of empty cars from the tipple to the mine. The inside workings are laid off on the triple-entry system. The inside haulage is by electric motors, and about 75 per cent. of the coal is mined by air machines. Some of the slack coal is sold for steam purposes, but most of it is coked at the mine. The lump coal is used largely as a steam coal where smoke ordinances are in effect, as it burns with little smoke. Some of it is exported and a small percentage used for domestic purposes. The daily output of the mine is from 800 to 1,000 tons, most of which finds it way to the large cities in the East and Middle West."

Two additional analyses are given under **Mine No. 188** in Table No. 3 at the end of this Chapter, Laboratory Nos. 5436 and 5438, the same being from car samples of coal shipped to the United States Fuel-Testing Plant, Norfolk, Va., in 1907, as given on page 12 of Bulletin 362 of the U. S. Geological Survey.

Additional analyses of samples of this coal used in boiler test and coke tests as also analyses of three coke samples, as summarized on page 254 of Professional Paper 48, page 254, of the U. S. Geological Survey, are given under the descriptions of the specific tests on the following pages.

STEAMING TESTS.

Test No. 39—Regular and special observations on test of West Virginia No. 6 Coal, October 27, 1904.

REGULAR.

(Duration of trial, 9.95 hours).

Time.	Steam pressure gage.	Temperatures.			Calorimeter.		Draft pressures.		Flue gases.		
		Outside.	Boiler room.	Flue gases, base of stack.	Steam discharge	Water separated in 10 minutes.	In hood, in inches of water.	In furnace, in inches of water.	CO_2.	O_2.	CO.
	Lbs.	F.	F.	F.	Lbs.	Lbs.			P.C.	P.C.	P.C.
[illegible] ..	81	......	......	627	......	......	0.50	0.16	......	......	......
8:00 ..	82	42	46	620	......	......	.66	.17	......	......	......
8:20 ..	90	43	48	645	4.32	0.025	.66	.14	......	......	......
8:40 ..	82	44	48	580	......	......	.41	.14	7.0	13.1	0.0
9:00 ..	82	45	50	590	......	......	.39	.13	......	......	......
9:20 ..	83	46	52	625	4.27	.025	.63	.29	......	......	......
9:40 ..	81	47	53	575	......	......	.43	.21	8.4	11.4	.2
10:00 ..	83	48	53	610	......	......	.53	.16	......	......	......
10:20 ..	87	49	54	623	4.17	.019	.43	.15	......	......	......
10:40 ..	85	50	56	580	......	......	.43	.15	9.4	11.0	.0
11:00 ..	85	51	56	518	......	......	.37	.19	......	......	......
11:20 ..	85	52	58	545	4.07	.026	.39	.21	......	......	......
11:40 ..	83	53	59	540	......	......	.48	.25	9.0	10.5	.0
12:00 ..	79	53	60	572	......	......	.40	.13	......	......	......
12:20 ..	88	54	60	579	4.24	.023	.46	.22	......	......	......
12:40 ..	83	54	61	545	......	......	.41	.21	8.4	12.8	.2
1:00 ..	87	55	61	525	......	......	.26	.08	......	......	......
1:20 ..	87	55	62	530	4.17	.02	.34	.15	......	......	......
1:40 ..	90	55	62	581	......	......	.41	.16	8.2	12.4	.3
2:00 ..	83	55	62	571	......	......	.42	.10	......	......	......
2:20 ..	81	55	62	540	4.00	.02	.41	.17	......	......	......
2:40 ..	[illegible]	54	62	580	......	......	.57	.24	8.5	12.3	.0
3:00 ..	86	55	62	595	......	......	.39	.13	......	......	......
3:20 ..	83	55	61	565	4.09	.023	.40	.15	......	......	......
3:40 ..	83	54	61	610	......	......	.69	.23	8.4	13.6	.0
4:00 ..	83	54	61	552	......	......	.54	.16	......	......	......
4:20 ..	80	54	60	574	4.02	.025	.46	.08	......	......	......
4:40 ..	83	52	59	575	......	......	.34	.13	8.4	13.7	.0
5:00 ..	86	50	58	585	......	......	.39	.03	......	......	......
5:20 ..	80	49	58	574	4.07	.026	.31	.09	......	......	......
[illegible]	81	......	......	......	......	......	......	......	7.4	13.8	.0
Total	[illegible]	1,483	1,665	17,331	41.42	.232	13.51	4.81	83.1	124.6	.7
Average	[illegible]	51	57.4	578	4.142	0.0232	.45	.16	8.31	12.46	.07

Test No. 39—Regular and special observations on test of West Virginia No. 6 coal, October 27, 1904—Continued.

SPECIAL.

Time.	Height of water.		Weight of coal burned.		Weight of water fed to boiler.	
	In tank.	In gage glass.	During period.	Total.	During period.	Total.
Start, 7:37	40	2¼	....	....	....	....
8:09	33½	5	700	700	2 586	2,586
8:54	38½	3¾	700	1,400	3,949	6,535
9:43	39½	3¼	700	2,100	5,823	12,358
10:33	35½	2¾	700	2,800	6,118	18,476
11:19	39	3	700	3,500	5,411	23,887
12:10	34½	4	700	4,200	4,986	28,873
1:11	39¾	4¾	700	4,900	6,400	35,273
2:13	45	3¼	700	5,600	6 558	41,831
3:12	40¼	3¾	700	6,300	6,444	48,275
4:31	41¾	3¼	700	7,000	7,695	55,970
Close, 5:34	40	2¼	406	7,406	5,414	61,384

RECORD OF FURNACE CONDITIONS.

Time	Observation.	Time	Observation.
6:45	Boiler under a load.	11:28	Fire raked, 12 inches thick.
7:00	Fire cleaned.	11:35	Fire sliced.
7:37	Fire started, fire 3 inches thick.	12:03	Fire raked, 12 inches thick.
7:48	Fire raked, 5 inches thick.	12:30	Fire raked, 12 inches thick.
8:06	Fire raked, 5 inches thick.	12:57	Fire raked, 12 inches thick.
8:28	Fire raked, 6 inches thick.	1:04	Fire sliced.
8:39	Fire raked, 8 inches thick.	1:28	Fire raked, 12 inches thick.
9:02	Fire raked, 10 inches thick.	2:22	Fire raked, 11 inches thick.
9:19	Fire raked, 10 inches thick.	2:48	Fire raked and sliced.
9:38	Fire raked, 11 inches thick.	3:39	Fire raked, 12 inches thick.
10:00	Fire raked, 11 inches thick.	4:40	Fire raked, 10 inches thick.
10:05	Fire sliced.	4:53	Cleaning fire, light clinkers on grate.
10:26	Fire raked, 12 inches thick.	5:02	Fire cleaned, 4 inches thick.
10:53	Fire raked, 12 inches thick.	5:34	Test closed, fire 3 inches thick.
11:07	Fire raked, 12 inches thick.		Furnace hotter than at start.

Ash white and of light weight. Coal burned freely. 107 firings during test.

	Test No. 39.	Test No. 43.
Designation and origin of fuel:		
Designation of bed	Fire Creek	Fire Creek
At or near	Rush Run	Rush Run
Size of fuel as shipped	Run-of-mine	Run-of-mine
Condition of fuel as fired:		
Appearance	Bright	Bright
State of weather:		
Morning	Clear	Clear
Afternoon	Clear	Clear
Boiler No	1	2
Kind of grate or stoker	Plain	Plain
Trial:		
Date	10, 27, 04	11, 1, 04
Duration (hours)	9.95	10.18
Grate surface (square feet)	40.55	40.55
Kind of draft	Natural	Natural
Average pressure:		
Barometer (inches of mercury)	29.75	29.73
Steam gage (pounds per square inch)	83.6	83.6
Force of draft (inches of water)—		
Hood	.45	.46
Furnace	.16	.18
Under fire	.00	.00

	Test No. 39.	Test No. 43.
Average temperatures (° F.):		
External air	51	61
Fire room	57.4	68.0
Steam	326.3	326.3
Feed water—		
In tank	57.2	56.0
Entering boiler	182	196
Escaping gases	578	521
Furnace	....	....
Fuel:		
Total weight of fuel consumed (pounds)—		
As fired	7,406	7,264
Dry	7,248	7,111
Ash and refuse—		
Total (pounds)	508	498
Clinker (per cent.)	45	4
Total weight of combustible (pounds) determined from—		
Actual weight of ash	6,740	6,613
Analyses of ash and coal	6,639	6,532
Ash and refuse in dry fuel (per cent.)	7.01	7.00
Proximate analysis of fuel as fired (per cent.):		
Moisture	2.14	2.11
Volatile	22.38	21.44
Fixed Carbon	70.03	71.42
Ash	5.45	5.03
Sulphur (separately determined)	.70	.64
Ultimate analysis of dry fuel (per cent.):		
Carbon	83.71	84.16
Hydrogen	4.64	4.66
Oxygen	3.67	3.68
Nitrogen	1.70	1.71
Sulphur	.71	.65
Ash	5.57	5.14
Analyses of ash and refuse (per cent.):		
Carbon	40.32	43.02
Earthy matter	59.68	56.98
Fuel consumed per hour (pounds):		
Dry	728	698
Combustible determined from		
Actual weight of ash	677	649
Analyses of ash and coal	667	641
Dry per sq. ft. of grate area	17.95	17.21
Combustible per sq. ft. of water-heating surface determined from—		
Actual weight of ash	.333	.328
Analyses of ash	.328	.316
Calorific value of fuel per pound (B. T. U.):		
By oxygen calorimeter—		
Dry fuel	14,959	15,033
Combustible	15,841	15,848
By analysis—		
Dry fuel	14,800	14,872
Combustible	15,673	15,678
Quality of steam (per cent.):		
Moisture	.56	.76
Factor of correction (dry steam = unity)	.9957	.9942
Water evaporation:		
Water fed to boiler (pounds)—		
Total weight	61,384	61,465
Equivalent from and at 212° F.	73,486	73,660
Actually corrected for quality of steam (lbs.)	61,122	61,109
Factor of evaporation	1.1972	1.1984
Equivalent evaporated into dry steam from and at 212° F. (lbs.)	73,175	73,232
Per hour (pounds)—		
Corrected for quality of steam	6,143	6,001
Equivalent from and at 212° F.—		
Total	7,354	7,192
Per sq. ft. of water-heating surface	3.62	3.54
Horsepower:		
Developed on test	213.2	208.5
Builders' rating	210	210
Per cent. of rated horsepower developed	101.5	99.3

	Test No. 39.	Test No. 43.
Economic results (pounds of water evaporated per pound of fuel):		
Apparent under actual conditions as fired	8.29	8.46
Equivalent from and at 212°F.—		
As fired	9.88	10.08
Dry	10.09	10.30
Combustible determined from—		
Actual weight of ash	10.86	11.07
Analysis of ash and coal	11.02	11.21
Efficiency (per cent.) of:		
Boiler, from actual weight of ash	66.20	67.46
Boiler, from analysis of ash and coal	67.18	68.31
Boiler and grate	65.14	66.17
Smoke (per cent. of black)	23.0	22.6
Kind of firing	Alternate	Alternate
Methods of firing:		
Thickness of fire (inches)	11	12
Interval between—		
Normal firings (minutes)	5.6	6.7
Times of leveling or breaking up (hours)	.4	.5
Analysis of the dry gases (per cent.):		
Carbon dioxide (CO_2)	8.31	10.32
Oxygen (O_2)	12.46	9.50
Carbon monoxide (CO)	.07	.09
Nitrogen by difference (N_2)	79.16	80.09
Pounds of dry gases per pound of combustible	26.30	21.33
Heat balance:		
British Thermal Units—		
Total	15,841	15,848
Absorbed by boiler	10,642	10,825
Loss of heat due to—		
Moisture—		
In fuel	30	29
Of burning hydrogen	573	556
Carried away in dry gases	3,285	2,319
Incomplete combustion of carbon	75	78
Radiation and other losses	1 236	2,041
Per cent.:		
Absorbed by boiler	67.18	68.31
Loss of heat due to—		
Moisture—		
In fuel	.19	.18
Of burning hydrogen	3.62	3.61
Carried away in dry gases	20.74	14.63
Incomplete combustion of carbon	.47	.49
Radiation and other losses	7.80	12.88

Briquetting Tests.

"All of the West Virginia coals tested at the plant were good coking coals, so that there was little need of briquetting experiments.

"**West Virginia No. 6.**—The first test made on this coal was with 5 per cent. of the very glossy home-made pitch Y. The pressure used was the limit that could be obtained on the English machine, and the resultant briquets were hard, clean and strong, and had a sharp, glossy fracture. They were in every way equal to the best briquets that had been made on this machine. They weighed on an average 6.12 pounds each. On account of the excellent quality of the briquets with 5 per cent. of pitch, another ton was briquetted with only 3 per cent. of pitch Y. Extreme pressure was applied, and the resultant briquets were unusually smooth and glossy, but not quite strong enough. They crumbled instead of cracking clean under the blows of a hammer. The briquets containing 5 per cent. of pitch, when broken, made little or no waste and had a clean fracture.

"On the American machine the mixture containing 5 per cent. of pitch Y made very glossy and solid eggettes, which were very strong and would stand a great deal of very rough handling. One surprising quality of these briquets was that when tested in the cook stove they burned with little or no caking, although the coal itself is a very good coking coal. The briquets, when exposed to the weather, were affected but little and did not disintegrate appreciably. In burning they held together until entire consumed.

"This coal was also tested with the Hoffman patent binder, and the resultant eggettes were also of good quality, being hard, glossy, and clean; but in burning they caked more than those with 5 per cent. of pitch."

COKING TESTS.

West Virginia No. 6.

(Mine 188 on Map II).

"**Coking tests Nos. 27, 30, and 33.**—Run-of-mine coal from the New River Smokeless Coal Company, Rush Run, W. Va.

"Three tests were made on this coal, which was unwashed. The first charge, consisting of 13,000 pounds, was burned for 90 hours, and yielded 8,303 pounds, or 63.9 per cent., of light-gray, soft coke. The second charge, which consisted of 9,000 pounds, was burned for 66 hours, and yielded 6,399 pounds, or 71.1 per cent., of coke of somewhat better quality than the first, although still gray and light. The third charge consisted of 8,000 pounds of pulverized coal. It was burned for 44 hours, and yielded 5,849 pounds, or 73-1 per cent., of coke, which was dense and tough, but light in weight and color, and of poor ring."

ANALYSIS OF WEST VIRGINIA NO. 6 COAL.

Character of coal	Chemical laboratory number	Moisture	Volatile Matter	Fixed Carbon	Ash	Sulphur	Remarks
		Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	
Unwashed	[illegible]	[illegible]	[illegible]	71.92	[illegible]	[illegible]	Used in coking test No. 27.
Unwashed	1344	2.27	22.03	70.30	[illegible]	[illegible]	Used in coking test No. 30.
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Used in coking test No. 33.

COKING TEST AND COKE PRODUCTION.

Test number.	When charged.	When drawn.	Time in oven.	Coal charged (dry).	Large coke.	Medium coke.	Total coke made.	Breeze and ash.	Per cent. of yield.			
									Large.	Medium.	Total	Breeze and ash.
			Hours.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.				
27 (unwashed)..	Oct. 28, 2 p. m...	Nov. 1, 8 a. m..	90	13,000	5,285	3,018	8,303	381	40.7	23.2	63.9	2.9
30 (unwashed)..	Nov. 2, 2 p. m...	Nov. 5, 8 a. m..	66	9,000	4,161	2,238	6,399	382	46.2	24.9	71.1	4.2
33 (unwashed)..	Nov. 5, 5 p. m...	Nov. 7, 1 p. m...	44	8 000	3,832	2,017	5,849	273	47.9	25.2	73.1	3.4

PHYSICAL AND CHEMICAL PROPERTIES OF COKE PRODUCED.

Test number.	Grams in 1 cubic inch.		Pounds in 1 cubic foot.		Percentage by volume.		Compressive strength per cu. in. (one-fourth ultimate strength).	Height of furnace charge supported without crushing.	Hardness.	Specific gravity.	Chemical Laboratory number.	Chemical analysis.					
	Dry.	Wet.	Dry.	Wet.	Coke.	Cells .						Moisture.	Volatile matter.	Fixed carbon.	Ash.	Sulphur.	Phosphorus.
							Lbs.	Feet.				P. ct.	P. ct.	P. ct.	P. ct.	P. ct.	P. ct.
27	10.46	19.46	39.75	71.94	45	55	187	75	2.2	1.77	1336	2.83	2.17	89.84	5.16	0.69	0.008
30	13.2	22.04	50.16	83.75	45	55	200	80	2.7	1.87	1370	0.36	1.34	93.04	5.26	.76	.007
35	12.5	22.14	47.50	84.13	41	59	215	85	2.7	1.79	1379	1.89	1.83	88.80	7.48	.69	.006

"The coke made from the run-of-mine coal showed a very low ash and low sulphur and phosphorus, but it was gray, soft, and rather light. The cell structure was above standard; the burden-bearing qualities and hardness were lower than desirable. This suggested crushing the coal for a second test which increased its hardness and enabled it to carry a heavier burden. Though the cell structure remained the same, the color was improved and the coke was heavier. Ash, sulphur, and phosphorus were about the same as before. A third test was made with powdered coal in which the results did not differ very much from the previous ones, except that the coke seemer denser, was darker, and had a poor ring. The ash was somewhat higher. Sulphur and phosphorus the same as before, as was also hardness, but burden-bearing qualities were increased. As this coal is low in volatile matter, it is recommended that it be mixed with others higher in volatile matter; that it be coked in a retort oven, where a coke can be produced which will possess all the qualities of a standard coke and will be much superior to it on account of its low ash, sulphur, and phosphorus."

CUPOLA TESTS OF COKE.

Foundry test No. 6, on coke made from West Virginia No. 6 run-of-mine coal (unwashed), November 24, 1904.

(Coke from New River Smokeless Coal Company, Rush Run, W. Va.)

ANALYSIS OF COKE.

	Per cent.
Sulphur	0.70
Sulphur in ash	0.049
Volatile carbon	2.20
Fixed carbon	90.84
Ash	5.21
Moisture	1.75

Specific gravity, 1.77.
Appearance 8 (Connellsville, 10).

CHARGE.

(In pounds).

	1	2	3	4	5	Total
Coke	220	54	52	52	52	430
Pig iron	660	398	398	398	396	2,250
Scrap	220	134	132	132	132	750

RECORD OF MELT.

Blast pressure averaged 7½ ounces.
Blast on, 11:19 a. m.
Iron running, 11:25 a. m.
Iron in 6 minutes.

	Pounds.
Ladle No. 1, 11:37 a. m.	130
Ladle No. 2, 11:39 a. m.	175
Ladle No. 3, 11:40 a. m.	230

	Pounds.
Ladle No. 4, 11:41 a. m.	160
Ladle No. 5, 11:42 a. m.	258
Ladle No. 6, 11:43 a. m.	250
Ladle No. 7, 11:44 a. m.	235
Ladle No. 8, 11:45 a. m.	155
Ladle No. 9, 11:47 a. m.	245
Ladle No. 10, 11:48 a. m.	115
Ladle No. 11, 11:50 a. m.	210
Ladle No. 12, 11:52 a. m.	115
Ladle No. 13, 11:53 a. m.	20
Total iron poured	2,298
Rate (pounds per hour)	8,610
Iron recovered	320
Coke recovered	10

Melting loss, 12.7 per cent.

Fluidity strips ran up well. Iron hot. Iron ran well throughout heat. Coke can be recommended for further trial.

Foundry test No. 11, on coke made from West Virginia No. 6, pulverized coal (unwashed), November 26, 1904.

(Coke from New River Smokeless Coal Company, Rush Run, W. Va.

ANALYSIS OF COKE.

	Per cent.
Sulphur	0.70
Sulphur in ash	0.076
Volatile carbon	1.85
Fixed carbon	89.60
Ash	7.55
Phosphorus	0.006
Moisture	1.00

Specific gravity, 1.79.
Appearance, 9 (Connellsville, 10).

CHARGE.

(In pounds).

	1	2	3	4	5	Total
Coke	200	59	57	57	57	430
Pig iron	600	414	412	412	412	2,250
Scrap	200	138	138	138	136	750

RECORD OF MELT.

Blast pressure averaged 7½ ounces.
Blast on, 2:55 p. m.
Iron running, 3:01 p. m.
Iron in 6 minutes.

	Pounds.
Ladle No. 1, 3:08 p. m.	100
Ladle No. 2, 3:10 p. m.	170
Ladle No. 3, 3:11 p. m.	180
Ladle No. 4, 3:13 p. m.	250
Ladle No. 5, 3:14 p. m.	150
Ladle No. 6, 3:16 p. m.	235
Ladle No. 7, 3:18 p. m.	250
Ladle No. 8, 3:19 p. m.	230
Lable No. 9, 3:21 p. m.	175
Ladle No. 10, 3:22 p. m.	235
Ladle No. 11, 3:24 p. m.	160
Ladle No. 12, 3:26 p. m.	195
Ladle No. 13, 3:27 p. m.	65
Total iron poured	2,395
Rate (pounds per hour)	7,560
Iron recovered	325
Coke recovered	18

Melting loss, 3.9 per cent.

Fluidity strips did not run up well. Iron dull. Iron not fluid though fairly hot.

Rock Lick Coal Co. (Formerly Thurmond Coal Co.)
"Erskine Mine"—No. 189 on Map II.

On north hillside of New River, ¾ mile due north of Thurmond; **Fire Creek Coal**; elevation, 1480′ B.; section by Messrs. Brady and Edmonds; correlation verified by author.

	Feet.	Inches.
Coal	4	4

The analysis of a sample of coal collected at this mine by Messrs. Brady and Edmonds, as reported by Prof. Hite and published by Dr. White under No. 5 on page 670 of Volume II and republished by him under the same number on page 182 of Volume II(A) and page 233 of Bulletin 2 of the Survey, is given under **Mine No. 189** in Table 1 at the end of this Chapter.

New River & Pocahontas Consolidated Coal Co. (Formerly W. P. Rend) (Abandoned) Mine—No. 190 on Map II.

On south hillside of Arbuckle Creek, ½ mile northwest of Thurmond; **Fire Creek Coal**; elevation, 1465′ B.; examined by author; abandoned on account of fault.

New River & Pocahontas Consolidated Coal Co. (Formerly W. P. Rend) (Abandoned) No. 1 Mine—No. 191 on Map II.

On south hillside of Arbuckle Creek, 1.3 miles northwest of Thurmond; **Fire Creek Coal**; elevation, 1420′ B.; section by Messrs. Brady and Edmonds; correlation verified by author.

	Feet.	Inches.
Coal	3	4½

Abandoned on account of fault.

The analysis of a sample of coal collected at this mine by Messrs. Brady and Edmonds, as reported by Prof. Hite and published by Dr. White under No. 15 on pages 670-1 of Volume II and republished by him under the same number on page 182 of Volume II(A) and page 233 of Bulletin 2 of the Survey, is given under **Mine No. 191** in Table 1 at the end of this Chapter.

The bed was also measured and sampled at two points by David White of the U. S. Geological Survey on July 12, 1909, as given on page 953 of Bulletin 22 of the U. S. Bureau of Mines.

Section A (sample 8240) was cut from pillar in right entry 2, near right entry 3, 1,000 feet from drift mouth; thickness of bed 6′ 1⅞″; thickness of coal sampled, 5′ 11½″.

Section B (sample 8241) was cut from pillar in left entry 3, 1,200 feet southeast of drift mouth; thickness of bed, 5′ 11¾″; thickness of coal sampled, 5′ 5⅞″.

A **composite sample** was made by mixing samples 8240 and 8241 for an ultimate analysis, the results of which are shown under laboratory **No. 8300.**

These 3 analyses, as taken from page 243 of Bulletin 22 of the U. S. Bureau of Mines, together with an air-dried calculation of the analysis of the composite sample (8300) as published by Dr. I. C. White under No. 10, page 236, of Bulletin 2 of the W. Va. Geological Survey, are given under **Mine No. 191** in Table 3 at the end of this Chapter.

"Notes.—The coal was undercut by hand at bottom of bed. It was not screened but was shipped in run-of-mine form without picking. It is a coking coal, but no coke was being made at the time of sampling in 1909. The daily output in July, 1909, averaged 200 tons, and the maximum day's run was 225 tons. The output was derived almost entirely from pillars. Thickness, fairly uniform, ranging from 4½ feet to 5½ feet. The roof is a dark-blue shale pieces of which at times got mixed with the coal in loading. There is a cap rock of sandstone 5 incnes above the coal. The floor is a hard clay with a smooth surface."

Newlyn Coal Co. "Newlyn" ("Thomas") Mine—
No. 192 on Map II.

On northwest hillside of Dunloup Creek, at Newlyn, 1 mile southwest of Thurmond; **Fire Creek Coal**; elevation, 1530′ B.; section by Teets.

	Feet.	Inches.
Slate, 4′ 0″ to	30	0
Coal, soft, columnar	3	5
Fire clay floor, visible, good	5	0

"Organized in 1905 under the above name; principal office, Newlyn, W. Va.; used for steam purposes; shipped east and west; output, 100 tons daily; capacity, 250 to 300 tons daily; number of men employed, 25 miners and 4 laborers; H. P. Thomas, Mine Foreman, authority for mine data."

The author also measured a section of the bed at this mine in 1907 and collected a sample for analysis, the results being published by Dr. White on page 184 of Volume II(A), as follows:

	Feet.	Inches.
1. Slate, good roof		
2. **Coal**, soft, 15″ to (fire clay floor)	3	6

"Greatest rise, S. 40° E.; butts, S. 60° E.; faces N. 30° E.; mine capacity, 200 tons; men employed, 90; analysis of sample published under No. 27 in Table No. 1, page 168, of Volume II(A) and republished under the same number on page 218 of Bulletin 2 of the Survey; shipped largely for smithing and domestic use both east and west; some faulting in this coal, a drop of 10 feet being plainly visible; Harry P. Davis, the Mine Foreman, and Jas. H. Boyd, Secretary of the Company, authorities for mine data."

The analysis of this sample as made in the Survey Laboratory is given under **Mine No. 192** in Table 1 at the end of this Chapter.

The bed was also measured and sampled at one point by A. J. Hazlewood of the U. S. Geological Survey on July 30, 1909, as given on page 952 of Bulletin 22 of the U. S. Bureau of Mines.

Sample 8600 was cut from the face of room 5 on entry 2, 500 feet west of the drift mouth. It represented 2 feet 8½ inches of coal. The analysis of this sample, as given on page 243 of Bulletin 22 of the U. S. Bureau of Mines, is given under **Mine No. 192** in Table 3 at the end of this Chapter.

"Notes.—The coal at this mine was undercut with picks, and was shot down with black powder. The coal was loaded in run-of-mine form, there being no screens at the tipple. The estimated output of this mine in July, 1909, was 100 tons per day, and was derived entirely from advance work. Thickness, 2 feet 8 inches; roof, soft shale; floor, underclay with smooth surface."

Dunglen Coal Co. (McKell Estate) "Fire Creek Mine"—
No. 193 on Map II.

On southeast hillside of Dunloup Creek, 0.4 mile southeast of mouth of Camp Creek; **Fire Creek Coal**; elevation, 1745′ B.; section by the author as published by Dr. White on pages 183-4 of Volume II(A) in 1908.

		Feet.	Inches.
1.	Sandstone, **Raleigh**, massive, and concealed..	106	0
2.	**Coal, soft, "Noah Jenkins" seam (Beckley)..**	1	1
3.	Sandstone and slate bluish, good roof......	55	0
4.	**Coal, soft, Fire Creek**......................	2	0

"Greatest rise, S. 40° E.; butts, S. 60° E.; faces, S. 30° W.; mine capacity, 10 tons; only a prospect mine; loaded with coal from Sewell seam above and shipped both east and west; for analysis of the coal samples taken here, see Table No. 1, page 166; principal office, Dunglen, Fayette County, W. Va.; J. W. Hart, authority for mine data. The small seam of coal occurring here at 55 feet above the Fire Creek seam is locally known as the 'Noah Jenkins' bed, but it is most probably the representative of the Beckley Coal, the usual interval (109′) separating it from the Fire Creek bed having thinned away, and become only 55 feet here instead of its usual thickness."

The analysis of this sample, as published on page 168 of Volume II(A), No. 26, and republished by Dr. White under the same number on page 218 of Bulletin 2 of the W. Va. Geological Survey, is given under **Mine No. 193** in Table 1 at the end of this Chapter.

Stonewall Coal & Coke Co. Exposure—No. 537 on Map II.

On Raleigh-Fayette County Line, 1.7 miles southwest of McKendree; **Fire Creek Coal**; elevation, 1940′ B.; section by Teets as published by C. E. Krebs in Raleigh County Report of the Survey under No. 460 on page 543.

	Feet.	Inches.
Coal (with slate roof and floor)..................	2	2

Coal Prospect—No. 538 on Map II.

On northwest hillside of New River, 0.4 mile N. 5° W. of Terry; **Fire Creek Coal**; elevation, 1930′ B.; butts, N. 33° W.; faces N. 57° E.; greatest rise, southeast; section by Teets as published by C. E. Krebs under No. 459 on page 543 of the Raleigh County Report of the Survey.

	Feet.	Inches.
Coal (with shale roof and slate floor)...........	4	1

The analysis of a sample (456-T) collected from above mine by Teets, as reported by Messrs. Hite and Krak, and published under No. 459 on page 640 of the Raleigh County Report of the Survey, is given under **Mine No. 538** in Table 1 at the end of this Chapter.

Stonewall Coal & Coke Co. "Terry Mine"—No. 205 on Map II.

On west hillside of New River, ¾ mile southwest of Terry; **Fire Creek Coal**; elevation, 1940′ B.; used in Terry Section, page 207; section by Teets as published by C. E. Krebs under No. 62 on pages 542-3 of the Raleigh County Report of the W. Va. Geological Survey; butts, N. 33° W.; faces, N. 57° E.; greatest rise, southeast; men employed, 110; daily output, 200 tons; coal shipped east to tidewater for steam purposes.

	Feet.	Inches.
Coal (with slate roof and floor)................	4	2

The bed was also measured and sampled at three points by J. W. Groves of the U. S. Geological Survey on July 15, 1909, as given on page 1066 of Bulletin 22 of the U. S. Bureau of Mines.

Section A (sample 8353) was cut from the face of room 11, off right entry 2, 2,200 feet north from the drift mouth; thickness of bed and of coal sampled, 4′ 11¼″.

Section B (sample 8354) was cut from the face of main entry 2, 2,000 feet east of the drift mouth; thickness of bed, 2′ 6¾″; thickness of coal sampled, 1′ 9¾″

Section C (sample 8355) was cut from the face of left entry 1, in room 3, 1,000 feet south of the drift mouth; thickness of bed and of coal sampled, 3′ 1″.

A **composite sample** was made by mixing the face samples 8353, 8354, and 8355 for an ultimate analysis, the results of which are shown under laboratory **No. 8423.**

These 4 analyses, as taken from page 291 of Bulletin 22 of the U. S. Bureau of Mines, together with an air-dried calculation of the analysis of the composite sample (8423) as published by Dr. White under No. 6 on page 235 of Bulletin 2 of the W. Va. Geological Survey, are given under **Mine No. 205** in Table 3 at the end of this Chapter.

"Notes—the coal at this mine was undercut with picks and shot down with black powder. The tipple was equipped with bar screens with 2-inch spaces. It was capable of loading lump, screenings, and run-of-mine coal, and had a storage-bin capacity of 100 tons. The coal was cleaned by two pickers as it was loaded on the railroad cars. The daily output of the mines at the time of sampling in 1909 was 350 tons, derived largely from pillars. The coal varies considerably in thickness, ranging from 2 to 5 feet. The roof is fairly good in places and in others is rather bad, being a 'slippy' shale. Some of it fell, and got mixed with the coal in mining. The floor is a gray underclay which in general presents a fairly good surface for shoveling."

Sewell Mountain District.

In Sewell Mountain District, the thickness and stratigraphic position of the Fire Creek Coal are exhibited in the sections published in Chapter IV for Mouth of Manns Creek, Beury, Ravenseye, Corliss—1 Mile North, Sims Schoolhouse, and Sievy Bridge Station; and in the logs of Coal Test Borings Nos. 97, 111, 119, and 120 on Map II, page references to all of which are given in the Index. This bed has long been operated commercially on the New River frontage of this District, four different mines having been opened on it here. In other localities it has been prospected considerably by the large land-holding companies. Its description at these mines, diggings, and other exposures follows.

Coal Opening—No. 539 on Map II.

On east hillside of New River, 1 mile due south of Sewell; **Fire Creek Coal**; elevation, 1575′ B.; section by author.

	Feet.	Inches.
Shale, black, visible	10	0
Coal, soft, (slate, gray, floor)	4	8

Coal mined here to supply residents on top of hill.

Fire Creek Coal & Coke Co. Opening—No. 540 on Map II, on southeast hillside of New River, 0.3 mile S. 15° E. of Fire Creek Station; **Fire Creek Coal**; elevation, 1770′ B., as determined by the author, had fallen shut and thickness of bed not learned.

Fire Creek Coal & Coke Co. "Fire Creek Mine"—
No. 194 on Map II.

On east hillside of Fire Creek, 1 mile S. 10° E. of Fire Creek Station; **Fire Creek Coal**; elevation, 1865′ B.; section by Teets at pit mouth, shows 4′ 2″ of coal with slate roof and floor.

"Has always run under this name—40 years; used for domestic and steam purposes; shipped east and west; output, 200 tons daily; capacity, 250 to 300 tons daily; number of men employed, 70 miners and 20 laborers; H. H. Blackburn, Superintendent, authority for mine data."

Messrs. Brady and Edmonds reported a thickness of 3 feet 6 inches when they sampled the coal at this mine in 1902 as reported along with the analysis under No. 1 on page 670 of Volume II by I. C. White. The analysis was republished by Dr. White under the same number on page 182 of Volume II(A) and page 233 of Bulletin 2 of the Survey. It is given under **Mine No. 194** in Table 1 at the end of this Chapter.

The analysis of a sample of coke collected by Messrs. Brady and Edmonds, as reported by Prof. Hite and published by Dr. White under No. 1 on page 671 of Volume II and republished by him under the same number on page 183 of Volume II(A) and page 234 of Bulletin 2 of the Survey, is given under **Mine No. 194** in Table 2 at the end of this Chapter.

Beury Bros. Coal & Coke Co. (Formerly Echo Coal & Coke Co.) "Echo Mine"—No. 196 on Map II.

On south hillside of New River, ½ mile southwest of Beury; **Fire Creek Coal**; elevation 1560′ B.; section by author.

		Feet.	Inches.
Sandstone, hard, roof			
Coal, very soft, columnar	1′ 10″		
Coal, columnar, harder (slate floor)	1 3	3	1

"Nearly all mined out." (For mine data, see description of mine No. 176, page 784).

Messrs. Brady and Edmonds reported a thickness of 4′ 2″ of coal at this mine when they sampled the same for analysis in 1902. This analysis, as reported by Prof. Hite, was published by Dr. White under No. 3 on page 670 of Volume II, and republished by him under the same number on page 182 of Volume II(A) and page 233 of Bulletin 2 of the Survey, and it is given under **Mine No. 196** in Table 1 at the end of this Chapter.

The bed was also measured and sampled at two points by David White of the U. S. Geological Survey on June 30, 1909, as given on pages 953-4 of Bulletin 22 of the U. S. Bureau of Mines.

Section A (**sample 8242**) was cut from Baltimore heading, left entry 5, 1½ miles from drift mouth; thickness of bed and of coal sampled 4′ 5⅞″.

Section B (**sample 8243**) was cut from Echo No. 2 of Klondike drift, left entry 1, 1,900 feet from mouth; thickness of bed and of coal sampled, 4′ 3⅝″.

A **composite sample** was made by mixing samples 8242 and 8243 for an ultimate analysis, the results of which are shown under laboratory **No. 8289**.

These 3 analyses, as taken from page 243 of Bulletin 22 of the U. S. Bureau of Mines, are given under **Mine No. 195** in Table 3 at the end of this Chapter.

"Notes.—The coal at this mine was undercut at the bottom part of the bed. The coal was all shipped in run-of-mine form without being picked. The daily output averaged 200 tons, and 250 tons was a maximum day's run in June, 1909. A large part of the old mine was abandoned on account of a squeeze. The mine was approaching exhaustion and the future tonnage was to be derived principally from pillars. Thickness, fairly uniform, averaging about 4½ feet; roof, heavy blue shale with a smooth surface. The cap rock of sandstone is 24 feet above the coal. The floor is a hard smooth underclay."

Big Bend Coal Co. "Dimmock Mine"—No. 197 on Map II.

On southeast hillside of New River, ¼ mile west of Dimmock, **Fire Creek Coal**; elevation, 1535′ B.; section by author measured on rib, 30 feet in; operating about 25 years.

				Feet.	Inches.
1.	Sandstone, flaggy, hard, roof				
2.	**Coal**, soft, columnar	0′	6″		
3.	Shale, gray	0	3		
4.	**Coal**, soft, columnar	2	10	3	7

"No. 3 of section is reported to thicken up to 18 inches in mine. Coal (4) is first taken out and then an auger hole bored at base of No. 2 to blow No. 3 down which is gobbed along with any loose coal that falls with it, then as much of No. 2 is saved as can be kept clean economically, says John Moses, an employee."

Messrs. Brady and Edmonds reported a thickness of 3′ 3″ when they measured and sampled the coal in 1902. The analysis, as reported by Prof. Hite and published by Dr. White under No. 4 on page 670 of Volume II and republished by him under the same number on page 182 of Volume II(A) and page 233 of Bulletin 2 of the Survey, is given under **Mine No. 197** in Table 1 at the end of this Chapter.

Thayer & Butler (Formerly Fire Creek Collieries Co.) "Pennbrook Mine"—No. 195 on Map II.

On Ephraim Creek, 1.4 miles S. 70° E. of Pennbrook; **Fire Creek Coal**; elevation, 2125′ B.; examined by author; abandoned 5 or 6 years; reported pinched out by rock.

Coal Opening—No. 541 on Map II, on head of Ephraim Creek, 2 miles S. 40° W. of Landisburg, is in the Fire Creek Coal, at an elevation of 2605′ L., but the thickness of the bed was not learned.

Coal Prospect—No. 542 on Map II.

On east bank of Butler Branch of Glade Creek, 0.8 mile due south of Landisburg; **Fire Creek Coal**; elevation, 2390′ L.; section by author.

			Feet.	Inches.
Concealed				
Shale, dark, visible			2	0
Cannel slate, 8″ to			0	9
Coal, slaty	0′	3″		
Slate, bony	0	1		
Coal, soft	1	3		
Coal, gray, harder	0	8		
Coal, soft	1	11		
Slate, black	0	0½		
Coal, soft	0	6½		
Coal, bony	0	10	5	7
Shale, gray			0	11
Bony slate			0	3
Shale, gray			5	0
Concealed to Butler Branch			7	0

Coal Prospect—No. 543 on Map II.

On west bank of Glade Creek, in south edge of Landisburg; **Fire Creek Coal**; elevation, 2340′ B.; examined by author.

			Feet.	Inches.
Coal, bony, visible	0′	5″		
Coal, soft	0	7		
Slate, black, ½″ to	0	1		
Coal, soft (slate floor)	3	6	4	7

Thos. Stead Coal Prospect—No. 544 on Map II.

On south hillside of Meadow River, 2.4 miles southeast of Russellville; **Fire Creek Coal**; elevation, 2120′ B.; used in Corliss Section, page 201; examined by author.

			Feet.	Inches.
Shale, gray, argillaceous, visible			3	0
Coal, soft	0′	7″		
Slate, black	0	0¼		
Coal, soft (slate floor)	1	8	2	3¼

Gauley Coal & Land Co. Digging (Closed)— No. 545 on Map II.

On north bank of Burdette Creek, 0.2 mile east from Meadow River; **Fire Creek Coal**; elevation, 2330′ B.; examined by author.

	Feet.	Inches.
Coal, reported by Mr. H. W. Osborne	1	6

Sulphur spring here. This coal belongs immediately on top of a grayish-white, quartzitic sandstone (Pineville?) cliff, 30 to 50 feet thick.

Gauley Coal & Land Co. Digging (Closed)— No. 546 on Map II.

On south bank of Burdette Creek, 0.35 mile east from Meadow River; **Fire Creek Coal**; elevation, 2340′ B.; examined by author.

	Feet.	Inches.
Coal, reported by Mr. H. W. Osborne	1	8

A. F. Crookshank Coal Opening—No. 547 on Map II.

On west hillside of Meadow River, 0.4 mile northwest of Rader Ford; **Fire Creek Coal**; elevation, 2405′ B.; examined by author; digging closed.

	Feet.	Inches.
Coal, reported by Morris Crookshank and Jas. A. Amick, 2′ 0″ to	2	6

Coal Exposure—No. 548 on Map II.

In hill road, 1.2 miles west of Rainelle; **Fire Creek Coal**; elevation, 2825′ B.; examined by author.

	Feet.	Inches.
Coal, soft, visible	1	3

Coal Prospect—No. 549 on Map II.

On west hillside of Sewell Creek, ½ mile N. 25° W. of Sievy Bridge Station; **Fire Creek Coal**; elevation, 2935′ B.; used in Sievy Bridge Station Section, page 205; examined by author.

	Feet.	Inches.
Coal, reported at closed prospect by Mr. Geo. Sievy	1	6

Quinnimont District.

In Quinnimont District and the immediately adjoining region, the thickness and stratigraphic position of the Fire Creek Coal are exhibited in the sections published in Chapter IV for Terry, Royal, Grandview—Royal, Quinnimont—North Side, Quinnimont—South Side, and Lawton—½ Mile Southwest; and in the logs of Coal Test Borings Nos. 144-151, inclusive, on Map II, page references to all of which are given in the Index. On the New River frontage and on the waters of Laurel Creek, the Fire Creek Coal has long been mined commercially. In other localities it has been prospected considerably by the large land-holding companies. Its description at these commercial mines, diggings, and other exposures follows.

Stone Cliff Coal & Coke Co. (Formerly Beury Coal & Coke Co.) Mine—No. 198 on Map II.

On east hillside of New River, ½ mile east of Stonecliff; **Fire Creek Coal**; elevation, 1715′ B.; section by Teets, at pit mouth.

			Feet.	Inches.
Sandstone, visible			10	0
Slate, dark			6	0
Coal	0′	9″		
Slate, black	0	2		
Coal (fire clay floor)	2	2	3	1

"Principal office, Charleston; used for steam and domestic purposes; shipped east and west; output, 200 tons daily; capacity, 300 tons daily; number of men employed, 40 miners and 14 laborers; electric haulage; 75 coke ovens, not now in use; J. H. Dempsey, Superintendent, authority for mine data."

Messrs. Brady and Edmonds also reported a thickness of 3′ 1½″ when they measured and sampled this bed in 1902. The analysis of the sample they collected, as reported by Prof. Hite and published by Dr. White under No. 6 on page 670 of Volume II and republished by him under the same number on page 182 of Volume II(A) and page 233 of Bulletin 2 of the Survey, is given under **Mine No. 198** in Table 1 at the end of this Chapter. The mine at that time was being operated by the Beury Coal & Coke Company.

Brady and Edmonds also collected a sample of the coke manufactured at this mine, the analysis of which by Prof. Hite was published by Dr. White under No. 3 on page 671 of Volume II and republished by him under the same number on page 183 of Volume II(A) and page 234 of Bulletin 2 of the Survey. This analysis is given under **Mine No. 198** in Table 2 at the end of this Chapter.

The bed was also measured and sampled at two points by David White and H. M. Wolflin on June 19, 1909, as given on pages 947-8 of Bulletin 22 of the U. S. Bureau of Mines.

Section A (**sample 7995**) was cut from room 5, off left entry 1, off main entry, 1,400 feet west of drift mouth; thickness of bed and of coal sampled, 3′ 10$\frac{11}{16}$″.

Section B (**sample 7998**) was cut from room 1, off right entry 1, off main entry, 1,500 feet north of drift mouth; thickness of bed and of coal sampled, 5′ 2⅝″.

A **composite sample** was made by mixing samples 7995 and 7998 for an ultimate analysis, the results of which are shown under laboratory **No. 8250**.

These 3 analyses, as taken from page 240 of Bulletin 22 of the U. S. Bureau of Mines, together with an air-dried calculation of the analysis of the composite sample (8250) published by Dr. White under No. 8 on page 235 of Bulletin 2 of the W. Va. Geological Survey, are given under **Mine No. 198** in Table 3 at the end of this Chapter.

"Notes. The coal was undercut by hand in the bottom part of bed and was shot down with black powder. The tipple was not equipped with screens, and consequently the entire output was shipped as run-of-mine coal. The mine when measured and sampled in 1909 was running at about its full capacity and was averaging from 250 to 300 tons per day. No pillar pulling was done. Thickness, rather irregular, due to local rolls; roof, strongly bedded sandstone, underlain for the most part with blue clay shale; floor, hard, smooth clay; cover, about 150 feet thick."

Beechwood Coal & Coke Co. "No. 2 Mine"—
No. 199 on Map II.

On east hillside of New River, in branch, 1 mile N. 40° E. of Claremont; **Fire Creek Coal**; elevation, 2005′ B.; section by author 300′ to 400′ in on rib; entry down 1¼ to 1½ miles.

			Feet.	Inches.
Shale, black, roof				
Coal, soft, 0″ to	0′	7″		
Shale, gray, 0″ to	0	5		
Coal, soft	1	6		
Coal, gas, harder	0	6		
Coal, soft (slate, black, floor)	1	10	4	10

Coal averages slightly over 3½ feet, but sometimes reaches 5 feet; rope haulage; data for Mines Nos. 2 (199) and 1 (200): Principal office, Claremont; started operating in 1886; lease of Beury Coal & Coke Co., Little Fire Creek Coal & Coke Co. and Buffalo Creek Coal Co.; output 550 long tons 9-hour day; men employed, 80 inside and 20 outside; ship run-of-mine coal for steam, mostly east; E. L. Hawley, Superintendent, authority for mine data.

The bed was measured and sampled at two points by R. Y. Williams of the U. S. Geological Survey on July 2, 1909, as given on pages 911-912 of Bulletin 22 of the U. S. Bureau of Mines.

Section A (sample 8059) was cut from the face of the John Porter entry; thickness of bed and of coal sampled, 3′ 5¾″.

Section B (sample 8061) was cut from the face of the Old Folks entry; thickness of bed and of coal sampled, 3′ 9″.

A **composite sample** was made by mixing samples 8059 and 8061 for an ultimate analysis, the results of which are shown under laboratory **No. 8293.**

These 3 analyses, as taken from pages 224 and 225 of Bulletin 22 of the U. S. Bureau of Mines, together with an air-dried calculation of the analysis of the composite sample (8293) as published by Dr. White under No. 4 on page 235 of Bulletin 2 of the W. Va. Geological Survey, are given under **Mine No. 199** in Table 3 at the end of this Chapter.

"Notes.—(Applying to Mines Nos. 199 and 200).—The coal at these mines was undercut by hand in bottom part of bed, and was shot down with black powder. It is a coking coal, but there were no ovens at this plant. The entire output was shipped in run-of-mine form. The daily output in July, 1909, averaged 400 tons, and 600 tons was the maximum day's run. The future output was to be derived from both advance work and pillars. Thickness, fairly uniform, ranging as mined from 3 feet 6 inches to 4 feet 7 inches; dip 1° northwest; roof, blue carbonaceous slate 4 feet to 8 feet thick, which does not fall with the coal; floor, hard clay with smooth surface; cover, for the most part, 50 to 300 feet."

Beechwood Coal & Coke Co. "Mine No. 1"—
No. 200 on Map II.

On east hillside of New River, 0.3 mile northeast of Claremont; **Fire Creek Coal**; elevation, 2070' B.; section by author, 200 to 300 feet in.

			Feet.	Inches.
Coal, soft (slate roof)	1'	1"		
Coal, gray, harder	0	6		
Coal, soft	2	3	3	10
Shale, gray, sandy, visible			6	0

Entry is driven in about 2 miles; rope haulage; coal reported about 3 feet at face. For other mine data and notes, see description of Mine No. 2 (No. 199 on Map II) of this company on preceding pages.

Messrs. Brady and Edmonds reported a thickness of 1' 11" when they measured and sampled this mine in 1902. The analysis of this sample, as reported by Prof. Hite and published by Dr. White under No. 7 on page 670 of Volume II and republished by him under the same number on page 182 of Volume II(A) and page 235 of Bulletin 2 of the Survey, is given under **Mine No. 200** in Table 1 at the end of this Chapter.

Brady and Edmonds also collected a sample of the coke at this mine for analysis by Prof. Hite, whose results were published by Dr. White under No. 2 on page 671 of Volume II and republished by him under the same number on page 183 of Volume II(A) and page 234 of Bulletin 2 of the Survey. This analysis is given under **Mine No. 200** in Table 2 at the end of this Chapter.

The bed was also measured and sampled at three points by R. Y. Williams of the U. S. Geological Survey on July 1, 1909, as given on pages 911-912 of Bulletin 22 of the U. S. Bureau of Mines.

Section A (sample 8060) was cut from the face of the Simpson entry; thickness of bed and of coal sampled, 4′ 7⅛″.

Section B (sample 8062) was cut from the face of the Harry Jones entry; thickness of bed and of coal sampled, 4′ 3⅞″.

Section C (sample 8063) was cut from the face of the Beechwood main entry; thickness of bed and of coal sampled, 4′ 6⅝″.

A **composite sample** was made by mixing samples 8060, 8062, and 8063 for an ultimate analysis, the results of which are shown under laboratory **No. 8115**.

These 4 analyses, as taken from pages 224 and 225 of Bulletin 22 of the U. S. Bureau of Mines, together with an air-dried calculation of the analysis of the composite sample (8115) as published by Dr. White under No. 3 on page 235 of Bulletin 2 of the W. Va. Geological Survey, are given under **Mine No. 200** in Table 3 at the end of this Chapter.

Alaska Coal & Coke Co. (Abandoned Entry) "Alaska Mine"—No. 201 on Map II.

On north hillside of New River, 0.3 mile north of Alaska; **Fire Creek Coal**; elevation 2160′ B.; section by author at knuckle of old incline.

	Feet.	Inches.
Sandstone, visible	10	0
Shale, bluish-gray, laminated, siliceous	25	0
Coal, soft, columnar, 3′ 0″ to	3	3
Slate, gray, visible	1	6

Messrs. Brady and Edmonds reported a thickness of 4′ 1″ when they sampled this mine for analysis in 1902, as given by Dr. White along with the analysis by Prof. Hite under No. 8 on page 670 of Volume II. This analysis was also republished by Dr. White under the same number on page 182 of Volume II(A) and page 233 of Bulletin 2 of the Survey, and is given under **Mine No. 201** in Table 1 at the end of this Chapter.

The bed was also measured and sampled at two points by J. W. Groves of the U. S. Geological Survey on July 8, 1909, as given on pages 906-7 of Bulletin 22 of the U. S. Bureau of Mines.

Section A (sample 8169) was cut from a pillar in Bradley's room, about 5,200 feet north of the drift mouth; thickness of bed and of coal sampled, 3′ 8½″.

Section B (sample 8170) was cut from a pillar in the Davis entry, about 6,500 feet north of the drift mouth; thickness of bed and of coal sampled, 4′ 1½″.

A **composite sample** was made by mixing samples 8169 and 8170 for an ultimate analysis, the results of which are shown under laboratory **No. 8294**.

These 3 analyses, as taken from pages 222 and 223 of Bulletin 22 of the U. S. Bureau of Mines, are given under **Mine No. 201** in Table 3 at the end of this Chapter.

"Notes.—The coal was all loaded as run-of-mine coal. Two men loaded the coal at the tipple, picked slate, and trimmed the cars. The coal as mined ranges in thickness from 3 feet 6 inches to 4 feet 4 inches. The roof is of strong blue shale, which does not fall in the rooms. In the pillar drawing very little of the roof is mixed with the coal. The floor is of hard smooth underclay."

Alaska Coal & Coke Co. "Drift No. 2"—No. 202 on Map II.

On north hillside of New River, 0.9 mile N. 85° E. of Alaska; **Fire Creek Coal**; elevation, 2175′ B.; mine closed and abandoned (in 1914); used in Alaska—0.8 Mile East Section, page 206.

	Feet.	Inches.
Coal, 3′ 0″ to	4	0

Ephraims Creek Coal & Coke Co., Ephraims Creek" ("Buffalo") Mine—No. 203 on Map II.

On east hillside of New River, at Ephraim; **Fire Creek Coal**; elevation, 2390′ B.; section at main entry, 250 feet in, by author.

	Feet.	Inches.
Slate roof, black, good		
Coal, soft (slate, black, floor)	3	6

Started operating in 1902; main heading is driven back 2½ miles between Slater and Buffalo Creeks; output, 600 to 700 long tons daily; men employed, 125 miners and 30 laborers; shipped east and west for steam; the western shipments have about 10 per cent. of slack screened out; slack for forging and blacksmithing use; coal owned in fee; T. C. Harmon, Electrician, authority for mine data.

Messrs. Brady and Edmonds reported a thickness of 3′ 11″ when they measured and sampled this bed for analysis in 1902. The analysis, as reported by Prof. Hite and published by Dr. White under No. 12 on pages 670 and 671 of Volume II and republished by him under the same number on page 182 of Volume II(A) and page 233 of Bulletin 2 of the Survey, is given under **Mine No. 203** in Table 1 at the end of this Chapter.

The bed was also measured and sampled at four points by J. J. Rutledge and at one point by J. W. Groves, both of the U. S. Geological Survey, on July 7 and 8, 1909, as given on pages 951-2 of Bulletin 22 of the U. S. Bureau of Mines.

Section A (sample 8167) was cut from room 1, off Slater Hill to Buffalo haulway, 2,300 feet northeast of drift mouth; thickness of bed, 4′ 4½″; thickness of coal sampled, 3′ 10½″.

Section B (sample 8174) was cut from the face of room 2, off left entry 2, off left entry 9, 3,200 feet northwest of drift mouth; thickness of bed and of coal sampled, 3′ 7½″.

Section C (sample 8175) was cut from point near face of right entry 9, off right entry 2, 3,400 feet north of drift mouth; thickness of bed and of coal sampled, 3′ 5⅛″.

Section D (sample 8199) was cut from the face, 1,000 feet west of drift mouth; thickness of bed, 3′ 6″; thickness of coal sampled, 3′ 0″.

Section E (sample 8213) was cut from the face of north heading, 5,000 feet north of drift mouth.

A **composite sample** was made by mixing samples 8167, 8174, 8175, 8199, and 8213 for an ultimate analysis, the results of which are shown under laboratory **No. 8290.**

These 6 analyses, as taken from pages 242 and 243 of Bulletin 22 of the U. S. Bureau of Mines, are given under **Mine No. 203** in Table 3 at the end of this Chapter.

"Notes.—The coal at this mine was undercut by electric chain cutters and by hand, and was shot down with black powder. The tipple was equipped with bar screens with 1½- and ¾-inch spaces. The coal was picked on the cars by four or five trimmers. The daily output in July, 1909, averaged 1,100 tons, and 1,200 tons was a maximum day's run. The output in the near future was to be derived largely from pillars. Thickness, from 2 feet 6 inches to 3 feet 3 inches; main roof, dark shale of good quality with a smooth surface; roof has a thickness of 6 feet up to the sandstone cap rock; floor, hard gray underclay with rather smooth surface; cover from 30 to 250 feet thick."

The bed was also measured and sampled at one point in the mine by J. J. Rutledge, of the U. S. Geological Survey, on June 20, 1910, as given on page 351 of Bulletin 85 of the U. S. Bureau of Mines.

Section A (sample 10629) was measured at the face of room 5 off right entry 5 off the Slater entry; thickness of bed and of coal sampled, 3′ 6″.

The analysis of this sample, as taken from page 114 of the last mentioned Bulletin, is given under **Mine No. 203** in Table 3 at the end of this Chapter.

"Notes. The mine is worked by the room-and-pillar system. At the time of sampling, FFF black powder was used for breaking coal after undercutting it with electric chain cutters. The coal was screened over 1½-inch bar screens, and the screenings were passed over a ¾-inch screen. Pickers were employed on the car when loading; the capacity of the storage bins was 200 tons. There were two loading tracks. Practically all of the coal produced was from advanced workings. Daily output, 1,100 tons. Average thickness, 42 inches; dip, 3° west; roof, strong dark-gray shale about 4 feet thick; floor, hard smooth gray shale; coal bed contains some cannel coal."

Phoenix Coal Co. (Formerly Slater Coal Co., New River Colliery Co., and Ridgeview Coal Co.) "Slater" Mine—No. 204 on Map II.

On south-east hillside of New River, 0.7 mile due east of Thayer; **Fire Creek Coal**; elevation, 2245′ B.; section by Brady and Edmonds.

	Feet.	Inches.
Coal	3	5

The above mine was opened more than 30 years ago and was just starting up in October, 1916, after a shut down of about one year, according to J. C. Jones who lives on this property.

The analysis of a sample of coal collected at this mine by Messrs. Brady and Edmonds, as reported by Prof. Hite and published by Dr. White under No. 13 on pages 670 and 671 of Volume II and republished by him under the same number on page 182 of Volume II(A) and page 233 of Bulletin 2 of the Survey, is given under **Mine No. 204** in Table 1 at the end of this Chapter.

Wright Coal & Coke Co. Mine No. 2—No. 206 on Map II.

On east side of Piney Creek, 0.7 mile south from New River, in Raleigh County; **Fire Creek Coal**; elevation, 2000′ B.; butts, N. 30° W.; faces, N. 60° E.; greatest rise, southeast; capacity, 150 tons; men employed, 60; Frank P. Christian, President, Lynchburg, Va.; section by Teets, as published under Mine No. 65 on page 546 of the Raleigh County Report of the Survey by C. E. Krebs.

	Feet.	Inches.
Coal, (with slate roof and floor)	4	0

Royal Coal & Coke Co., "Royal Mine"—No. 207 on Map II.

On south hillside of New River, 0.3 mile due south of Royal, in Raleigh County; **Fire Creek Coal**; elevation, 2020′ B.; butts, N. 40° W.; faces N. 50° E.; greatest rise, southeast; men employed, 50; daily output, 150 tons; used for domestic and steam purposes; shipped east and west; E. E. Huddleston, General Manager, authority for mine data; section by Teets as published by C. E. Krebs under No. 64 on pages 545-6 of the Raleigh County Report of the W. Va. Geological Survey; used in Royal Section, page 208.

	Feet.	Inches.
Coal (with slate roof and floor)..................	3	2

Messrs. Brady and Edmonds reported a thickness of 3′ 4½″ when they measured and sampled this mine in 1902 as given with the analysis by Prof. Hite under No. 16 on pages 670 and 671 of Volume II by Dr. White, who republished the analysis under the same number on pages 182 and 183 of Volume II(A) and page 233 of Bulletin 2 of the Survey. This analysis is given under **Mine No. 207** in Table 1 at the end of this Chapter.

Glade Creek Land Co. Prospect—No. 550 on Map II.

On south hillside of New River, 2.2 miles west of Glade (Krise P. O.), in Raleigh County; **Fire Creek Coal**; elevation, 2200′ B; butts, N. 40° W.; faces N. 50° E.; not fully under cover; section by G. R. Krebs as published by C. E. Krebs under Mine No. 467 on page 547 of the Raleigh County Report of the Survey.

	Feet.	Inches.
Coal, gas (with slate roof and fire clay floor)...	2	10

Glade Creek Land Co. Prospect—No. 551 on Map II.

On south hillside of New River, 1.7 miles southwest of Glade (Krise P. O.), in Raleigh County; **Fire Creek Coal**; elevation, 2310′ B.; driven in about 60 feet; butts, N. 40° W.; faces, N. 50° E.; section by G. R. Krebs as published by C. E. Krebs under Mine No. 471 on page 548 of the Raleigh County Report of the Survey.

	Feet.	Inches.
Coal, gas (with slate roof and fire clay floor)...	4	2

"The analysis of a sample collected by J. B. Dilworth for E. V. d'Invilliers (No. 248) as reported by A. S. McCreath, of Harrisburg, Pa., is as follows:

	Per cent.
"Moisture	0.473
Volatile Matter	19.608
Fixed Carbon	76.267
Ash	3.652
Total	100.000
Sulphur	0.658"

Glade Creek Land Co. Prospect—No. 552 on Map II.

On west hillside of Glade Creek, 1.4 miles S. 25° W. of Glade (Krise P. O.), in Raleigh County; **Fire Creek Coal**; elevation, 2580′ B.; butts, N. 42° W.; faces, N. 48° E.; section by Teets as published by C. E. Krebs under Mine No. 475 on page 549 of the Raleigh County Report of the Survey.

	Feet.	Inches.
Coal, gas (with slate roof and fire clay floor)	3	3

"This opening was sampled by J. B. Dilworth for E. V. d'Invilliers (No. 251) and the analysis as made by A. S. McCreath of Harrisburg, Pa., is as follows:

	Per cent.
"Moisture	0.498
Volatile Matter	19.493
Fixed Carbon	72.184
Ash	7.825
Total	100.000
Sulphur	0.741"

Glade Creek Land Co. Prospect—No. 553 on Map II.

On west hillside of Glade Creek, 1.7 miles S. 20° W. of Glade (Krise P. O.), in Raleigh County; **Fire Creek Coal**; elevation, 2600′ B.; butts, N. 40° W.; faces, N. 50° E.; section by G. R. Krebs as published by C. E. Krebs under Mine No. 476 on page 550 of the Raleigh County Report of the Survey.

	Feet.	Inches.
Coal, weathered (with slate roof and floor)	3	8

Jas. H. Huling Prospect—No. 554 on Map II.

On south hillside of New River, 1 mile S. 45° E. of Glade (Krise P. O.), in Raleigh County ; **Fire Creek Coal**; elevation, 2550′ B.; butts, N. 35° W.; faces, N. 55° E.; section by G. R. Krebs as published by C. E. Krebs under Mine No. 514 on page 560 of the Raleigh County Report of the Survey.

			Feet.	Inches.
1. **Coal**, bony (with slate roof)	0′	6″		
2. **Coal**, impure	1	0		
3. **Coal**, gas (to fire clay floor)	4	5	5	11

The analysis of a sample collected from No. 3 by J. B. Dilworth for E. V. d'Invilliers and analyzed by A. S. McCreath of Harrisburg, Pa., as published in Volume II(A), page 183, of the Survey Reports, reads as follows:

	Per cent.
"Moisture	1.364
Volatile Matter	19.713
Fixed Carbon	71.603
Ash	7.320
Total	100.000
Sulphur	0.492"

Glade Creek Land Co. Prospect—No. 555 on Map II.

On south hillside of New River, 1.8 miles S. 70° E. of Glade (Krise P. O.), in Raleigh County; **Fire Creek Coal**; elevation 2660′ B.; not fully under cover; section by G. R. Krebs as published by C. E. Krebs under Mine No. 513 on page 559 of the Raleigh County Report of the Survey.

	Feet.	Inches.
Coal (with shale roof and fire clay floor)	5	0

Glade Creek Land Co. Prospect—No. 556 on Map II.

On south hillside of New River, 2.2 miles S. 70° E. of Glade (Krise P. O.), in Raleigh County; butts, N. 40° W.; faces, N. 50° E.; section by G. R. Krebs as published by C. E. Krebs under Mine No. 512 on page 559 of the Raleigh County Report of the Survey.

	Feet.	Inches.
Coal, gas (with slate roof and fire clay floor) **Fire Creek**	5	3

Quinnimont Coal Co. Mine—No. 208 on Map II.

On south hillside of Laurel Creek, 0.8 mile S. 40° E. of Quinnimont; **Fire Creek Coal**; elevation, 2200′ B.; used in Quinnimont—South Side Section, page 212; closed, examined by author.

	Feet.	Inches.
Coal, reported only 30 inches thick, but southwest on point reported by Jasper Ewing to have attained a thickness of	4	0

Messrs. Brady and Edmonds collected a sample of the coke manufactured at this mine in 1902 and the analysis, as reported by Prof. Hite and published by Dr. White under No. 5 on page 671 of Volume II and republished by him under the same number on page 183 of Volume II(A) and page 234

of Bulletin 2 of the Survey, is given under **Mine No. 208** in Table 2 at the end of this Chapter.

Quinnimont Coal Co. Old Drift—No. 557 on Map II, on south hillside of Laurel Creek, 1¼ miles S. 65° E. of Quinnimont, in the Fire Creek Coal, at an elevation of 2260′ B., as determined by the author, was a closed old abandoned drift and thickness of bed not learned.

Quinnimont Coal Co. Old Drift—No. 558 on Map II, on south hillside of Laurel Creek, 1.9 miles S. 65° E. of Quinnimont, at low gap, in the **Fire Creek Coal,** at an elevation of 2325′ B., as determined by the author, was an abandoned and closed old drift, the thickness of the coal not being learned.

Export Coal Co. (Formerly Robins Coal Co.) "Export Mine"—
No. 209 on Map II.

On north hillside of Laurel Creek, 2.4 miles northeast of Quinnimont; **Fire Creek Coal;** elevation, 2440′ B.;, section by A. J. Hazlewood; correlation by author.

	Feet.	Inches.
Coal, fragile, 1′ 11″ to	3	10¾

The author went back 500 to 600 feet in the main heading but could only get 2 feet of top portion of bed, the track having been raised—nobody outside, but mine was running.

The bed was also reported to have a thickness of 3′ 9″ by Messrs. Brady and Edmonds when they sampled it for analysis by Prof. Hite in 1902 as given under No. 9 on page 670 of Volume II by Dr. White who republished the analysis under the same number on page 182 of Volume II(A) and page 233 of Bulletin 2 of the Survey. This analysis is given under **Mine No. 209** in Table 1 at the end of this Chapter.

The bed was measured and sampled at four points by A. J. Hazlewood, of the U. S. Geological Survey, on July 5, 1909, as given on page 943 of Bulletin 22 of the U. S. Bureau of Mines.

Section A (sample 8891) was cut from the face of right entry 2, thickness of bed, 3′ 10¾″; thickness of coal sampled, 3′ 7¼″.

Section B (sample 8285) was cut from the face of main entry, 1,600 feet from drift mouth; thickness of bed and of coal sampled 2′ 6″.

Section C (**sample 8284**) was cut from the face of left entry 1, 200 feet from main entry; thickness of bed and of coal sampled, 1′ 11″.

Section D (**sample 8286**) was cut from the face of right entry 9, 500 feet from main entry; thickness of bed and of coal sampled, 3′ 8″.

A **composite sample** was made by mixing samples 8284 and 8285 for an ultimate analysis, the results of which are shown under laboratory **No. 8315.**

These 5 analyses, as taken from page 238 of Bulletin 22 of the U. S. Bureau of Mines, are given under **Mine No. 209** in Table 3 at the end of this Chapter.

"Notes.—The coal at this mine was mined by hand near the top of the bed, and was shot down with black powder. The tipple was not equipped with screens; the entire output was shipped as run-of-mine coal. This is a coking coal, but there was no ovens at this plant. The daily output of the mine in July, 1909, averaged 160 tons, and 200 tons was a maximum day's run. The future output was to be derived from advance workings. Thickness, fairly uniform, varying from 2 feet to 4 feet; main roof, tough shale, particles of which at times get mixed with the coal in loading; floor, hard sandstone or clay with smooth but rolling surface."

Laurel Creek Coal Co. "Laurel Creek Mine"—
No. 210 on Map II.

On north hillside of Laurel Creek, ¼ mile below mouth of Little Laurel Creek; **Fire Creek Coal**; elevation, 2455′ B.; started about 26 years ago; section by Brady and Edmonds.

	Feet.	Inches.
Coal	3	11½

Messrs. Brady and Edmonds also collected a sample of the coal for analysis by Prof. Hite whose results were published by Dr. White under No. 10 on page 670 of Volume II and republished under the same number by him on page 182 of Volume II(A) and page 233 of Bulletin 2 of the Survey. This analysis is given under **Mine No. 210** in Table 1 at the end of this Chapter.

The bed was also measured and sampled at three points on July 5, 1909, by C. A. Fisher, and later at one point by A. J. Hazlewood, of the U. S. Geological Survey, as given on page 927 of Bulletin 22 of the U. S. Bureau of Mines.

Section A (sample 8073) was cut from left straight heading 1; thickness of bed and of coal sampled, 3′ 9″.

Section B (sample 8074) was cut from left heading 7; thickness of bed and of coal sampled, 3′ 9½″.

Section C (sample 8075) was cut from right heading 12; thickness of bed, 3′ 11″; thickness of coal sampled, 3′ 9″.

Section D (sample 8892) was cut from face of left heading 1, off main heading 12, about 4,000 feet northwest of opening; thickness of bed and of coal sampled, 3′ 8½″.

A **composite sample** has been made by mixing samples 8073, 8074, and 8075. The results of an ultimate analysis of this sample are shown under laboratory **No. 8119.**

These 5 analyses, as taken from pages 231 and 232 of Bulletin 22 of the U. S. Bureau of Mines, together with an air-dried calculation of the analysis of the composite sample (8119) as published by Dr. White under No. 15 on page 236 of Bulletin 2 of the W. Va. Geological Survey, are given under **Mine No. 210** in Table 3 at the end of this Chapter.

"Notes.—The coal was mined by hand in the top coal. The tipple was not equipped with screens, so that the entire output of the mine was shipped as run-of-mine coal. The daily output at the time of sampling averaged about 400 tons, and 500 tons was a maximum day's run. There was approximately 2,900 acres of coal to be taken out from the opening. Thickness, nearly uniform, ranging as mined from about 3 feet 4 inches to 4 feet 6 inches; roof, hard, blue slate, between which and the coal there is sometimes a draw slate; floor, hard, smooth, shaly underclay."

Glendale Colliery Co. (Abandoned) "Glendale Mine"—
No. 211 on Map II.

On south hillside of Laurel Creek, ¼ mile east of mouth of Little Laurel Creek; **Fire Creek Coal**; elevation, 2485′ B.; used in Lawton—½ Mile Southwest Section, page 213; started about 18 to 20 years ago; abandoned 3 or 4 years.

	Feet.	Inches.
Coal, soft (with shale roof and floor)..........	3	6

The bed was also measured and sampled in two places by J. W. Groves of the U. S. Geological Survey on July 9, 1909, as given on page 922 of Bulletin 22 of the U. S. Bureau of Mines.

Section A (sample 8176) was cut from room 1 on right entry 1, off daylight entry, 800 feet north of drift mouth; thickness of bed and of coal sampled, 4′ 1½″.

Section B (sample 8200) was cut from room 2, Beck Burt entry, 1,400 feet north of drift mouth; thickness of bed and of coal sampled, 4′ 0″.

A **composite analysis** was made by mixing samples 8176 and 8200. The results of an ultimate analysis of this sample are shown under laboratory **No. 8410.**

These 3 analyses, as taken from page 229 of Bulletin 22 of the U. S. Bureau of Mines, are given under **Mine No. 211** in Table 3 at the end of this Chapter.

"Notes.—The coal at this mine was undercut with picks and shot down with powder. The entire work was in pillars, so very little shooting was required. Run-of-mine coal only was loaded. The mine in July, 1909, had a capacity of 350 tons, and the daily average output was 250 tons. The thickness of this coal ranges from 3 feet 10 inches to 4 feet 4 inches. The roof is a hard, smooth, black shale. The floor is a hard underclay which has a smooth surface. The conditions were favorable for loading clean coal."

Glendale Colliery Co. (Abandoned) Old Drift Opening—No. 212 on Map II, on south hillside of Little Laurel Creek, 0.7 mile east of Backus, in the **Fire Creek Coal,** at an elevation of 2620′ B., as determined by the author, had been worked out and abandoned in 1916.

Coal Exposure—No. 559 on Map II.

In ridge road, 0.9 mile southwest of Backus; **Fire Creek Coal;** elevation, 2545′ B.; examined by author.

	Feet.	Inches.
Coal blossom, 2′ 0″ to	3	0

New River & Pocahontas Consolidated Coal Co. Prospect—No. 560 on Map II, on point, ½ mile S. 20° W. of Backus, in the **Fire Creek Coal,** at an elevation of 2627′ L., as determined by the author, was closed and no section obtained.

New River & Pocahontas Consolidated Coal Co. Prospect—No. 561 on Map II, on north side of road, ¼ mile west of Harrah Schoolhouse, 0.9 mile southeast of Backus, in the **Fire Creek Coal,** at an elevation of 2645′ L., as determined by the author, was closed and no section obtained.

Quinnimont Coal & Coke Co. "Big Q Mine"—
No. 213 on Map II.

On south hillside of Laurel Creek, 0.2 mile southwest of Lawton; **Fire Creek Coal**; elevation, 2429′ L.; started 24 or 25 years ago; section by Brady and Edmonds.

	Feet.	Inches.
Coal	4	4

Messrs. Brady and Edmonds also collected a sample of the coal from this mine for analysis by Prof. Hite whose results were published by Dr. White under No. 11 on page 670 of Volume II and republished by him under the same number on page 182 of Volume II(A) and page 233 of Bulletin 2 of the Survey. This analysis is given under **Mine No. 213** in Table 1 at the end of this Chapter.

The bed was also measured and sampled by J. J. Rutledge of the U. S. Geological Survey on July 9, 1909, at three points, as given on pages 928-9 of Bulletin 22 of the U. S. Bureau of Mines.

Section A (sample 8197) was cut from left entry 1, off right entry 2, about 900 feet north of drift mouth; thickness of bed, 3′ 9″; thickness of coal sampled, 3′ 8½″.

Section B (8214) was cut from break-through between right entry 2 and air-course, about 3,000 feet northeast of drift mouth; thickness of bed, 3′ 9¼″; thickness of coal sampled, 3′ 8¾″.

Section C (sample 8215) was cut from break-through between right entry 2 and air-course, 2000 feet northwest of drift mouth; thickness of bed, 4′ 1¼″; thickness of coal sampled, 4′ 1″.

A composite sample was made by mixing samples 8197, 8214, and 8215 for an ultimate analysis, the results of which are shown under laboratory **No. 8299.**

These 4 analyses, as taken from page 232 of Bulletin 22 of the U. S. Bureau of Mines, together with an air-dried calculation of the analysis of the composite sample (8299) as published by Dr. White under No. 11 on page 236 of Bulletin 2 of the W. Va. Geological Survey, are given under **Mine No. 213** in Table 3 at the end of this Chapter.

Notes—The coal was mined by hand and was shot down with black powder. The entire output was shipped as run-of-mine coal. The daily output in July, 1909, averaged about 300 tons and that was also the capacity of the mine with its equipment at that time. The future output was to be derived from both advance work and from pillars. Thickness nearly uniform, ranging as mined from about 3 feet 8 inches to 4 feet 3 inches; roof, strong, dark shale; floor, dark, hard shale.

Greenwood Coal Co. ("Slater Hollow Drift") Mine—
No. 214 on Map II.

On branch of Tank Hollow, 1.2 miles N. 50° W. of Lawton; **Fire Creek Coal**; elevation, 2550′ B.; section by author taken 100 feet in on rib; still rising rapidly northwest; started about 25 years ago.

			Feet.	Inches.
Slate roof, bluish-black, visible			5	0
Coal, soft, columnar	1′	3″		
Coal, gray, medium-hard, columnar	0	6		
Coal, soft, columnar	2	3	4	0
Slate, gray, visible			1	0

Messrs. Brady and Edmonds also reported a thickness of 4′ 0″ when they measured and sampled this bed for analysis by Prof. Hite in 1902. This analysis was published by Dr. White under No. 14 on pages 670 and 671 of Volume II and republished by him under the same number on page 182 of Volume II(A) and page 233 of Bulletin 2 of the Survey, and it is given under **Mine No. 214** in Table 1 at the end of this Chapter.

Messrs. Brady and Edmonds also collected a sample of the coke manufactured at this mine, the analysis of which by Prof. Hite was published by Dr. White under No. 4 on page 671 of Volume II and republished by him under the same number on page 183 of Volume II(A) and page 234 of Bulletin 2 of the Survey, and it is given under **Mine No. 214** in Table 2 at the end of this Chapter.

Greenwood Coal Co. "Slater Creek Entry"—
No. 215 on Map II.

On north side of road, east side of Slater Creek, 1.7 miles N. 50° W. of Lawton; **Fire Creek Coal**; elevation, 2595′ B.; section by author 200 feet in, on rib.

			Feet.	Inches.
Shale, bluish-black, visible			3	0
Coal, soft	0′	11″		
Coal, gray, medium-hard	0	7		
Coal, soft (slate floor)	2	3	3	9

The author also measured another section of the coal in this mine at the northwest portal of "Mud Tunnel", 60 yards southeast of the Slater Creek Entry, as follows:

			Feet.	Inches.
Coal, soft (shale, black, roof)	1′	2″		
Coal, gray, harder	0	6		
Coal, soft	2	6	4	2
Shale, gray, visible			2	0

This mine was opened about 25 years ago.

The bed was also measured and sampled at two points on July 10, 1909, by J. W. Groves, and at two points July 10, 1909, by J. J. Rutledge, of the U. S. Geological Survey, as given on pages 927-8 of Bulletin 22 of the U. S. Bureau of Mines.

Section A (sample 8168) was cut from last break-through in Valentine entry, about 1,100 feet south of drift mouth; thickness of bed and of coal sampled, 4′ 2″.

Section B (sample 8198) was cut from neck of room 6 on right entry 2, off Valentine entry; thickness of bed and of coal sampled, 3′ 10½″.

Section C (sample 8177) was cut from right entry 2, off entry 7, about 3,600 feet northwest of drift mouth; thickness of bed and of coal sampled, 3′ 10½″.

Section D (sample 8212) was cut from Moss's entry, about 5,700 feet northwest of drift mouth; thickness of bed and of coal sampled, 4′ 3¼″.

Two composite samples were made: (1) by mixing samples Nos. 8168 and 8198 for an ultimate analysis, the results of which are shown under laboratory **No. 8407**; (2) by mixing samples 8212 and 8177 for an ultimate analysis, the results of which are shown under laboratory **No. 8408**.

These 6 analyses, as taken from page 232 of Bulletin 22 of the U. S. Bureau of Mines, are given under **Mine No. 215** in Table 3 at the end of this Chapter.

"Notes. The coal was undercut in the bed and was shot down with black blasting powder. The bin was equipped with bar screens 12 feet long with 1½-inch and ¾-inch openings. The screens in July, 1909, were not in use, the entire output being shipped as run-of-mine coal. The coal was picked on the car by four trimmers. The daily output in July, 1909, averaged about 150 tons, and 300 tons was the capacity of the mine. The future output for some time to come was to be derived almost entirely from pillar work. The mine operator had about 3,500 acres practically untouched. Thickness, very uniform, ranging as mined from about 3¾ feet to 4¼ feet; roof, strong, dark shale; floor, hard, gray shaly underclay."

Greenwood Coal Co. "Mud Tunnel Drift"—
No. 216 on Map II.

On west hillside of Chestnut Knob Fork of Laurel, 1 mile due north of Lawton; **Fire Creek Coal**; elevation, 2490′ B.; section by author in 1st Left off Mud Tunnel.

			Feet.	Inches.
Slate, bluish-black, visible			4	0
Coal, soft, columnar	1′	1″		
Coal, gray, medium-hard	0	4		
Coal, soft, columnar (slate, gray, floor)	2	5	3	10

Mr. W. M. Hurt, Foreman, says draw slate occurs only in patches, roof fairly good and always slate, either black or white; opened 25 to 26 years ago.

Hemlock Hollow Coal & Coke Co. "Hemlock Mine—
No. 217 on Map II.

In Hemlock Hollow, 0.7 mile northeast of Lawton; **Fire Creek Coal**; elevation, 2419′ L.; section by author at entrance of main entry.

	Feet.	Inches.
Shale	15	0
Coal, soft, **Fire Creek**	3	10
Fire clay shale	4	0
Shale, dark	2	0
Coal, slaty	0	6
Fire clay shale to railroad grade	8	0

"Drift starts in below coal."

The author also measured another section of the coal in this mine, as follows:

			Feet.	Inches.
Shale, bluish-black, visible			15	0
Coal, soft	0′	7″		
Coal, gray, medium-hard	0	5		
Coal, soft	2	5	3	5
Slate, gray, visible			1	0

Principal office, Lawton, W. Va.; lease from J. L. Beury Heirs and Laurel Creek Land Co.; average output, 250 long tons; capacity, [illegible] tons, 9-hour day; all run-of-mine coal; shipped mostly to tide-water for steam; men employed, 46 inside and 14 outside; R. W. Robb, Bookkeeper, authority for mine data. Started operation 15 to 18 years ago.

The bed was measured and sampled at two points in the mine by K. M. Way, of the U. S. Geological Survey, on September 28, 1907, as given on pages 920-1 of Bulletin 22 of the U. S. Bureau of Mines.

Section A (**sample 5419**) was measured in the face of left entry 4, off drift 1, 1,600 feet northeast of the mine mouth; thickness of bed and of coal sampled 3′ 11[illegible]″.

Section B (**sample 5420**) was measured in the face of right entry 2, off drift 4, 900 feet east of drift mouth; thickness of bed and of coal sampled, 3′ 10″.

The bed was also measured and sampled at two points by J. J. Rutledge, and at two points by J. W. Groves on July 14, 1919, and at two points by A. J. Hazlewood, of the U. S. Geological Survey, on August 10, 1909, as given on page 921 of Bulletin 22 of the U. S. Bureau of Mines.

Section A (**sample 8238**) was cut from face of main heading, near left entry 11; thickness of bed and of coal sampled, 3′ 9½″.

Section B (**sample 8239**) was cut from neck of room 5, off left entry 6, about 2,500 feet northwest of drift mouth; thickness of bed and of coal sampled, 3′ 8¾″.

Section C (**sample 8351**) was cut from a point about 1,800 feet east of drift mouth; thickness of bed and of coal sampled, 4′ 6″.

Section D (**sample 8352**) was cut from a point about 2,000 feet north of drift mouth; thickness of bed and of coal sampled, 3′ 11¾″.

Section E (**sample 8893**) was cut from room 5, off left entry 6, about 2,500 feet northwest of drift mouth; thickness of bed and of coal sampled, 3′ 9″.

Section (**sample 8894**) was cut from room 1, off entry 12, about [illegible] feet northeast of drift mouth; thickness of bed and of coal sampled, 3′ 10½″.

A **composite sample** was made by mixing samples 8351, 8352, and [illegible] for an ultimate analysis, the results of which are shown under laboratory **No. 8421**.

These 9 analyses, as taken from pages 228 and 229 of Bulletin 22 of the U. S. Bureau of Mines, as also analysis of sample No. 5575 from a car sample of run-of-mine coal from page 229 of the same Bulletin being republished from page [illegible] of Bulletin [illegible] of the U. S. Geological Survey, together with [illegible] calculations of sample No. 8238 and composite sample No. 8421, as given under Nos. 16 and 17, respectively, by Dr. White on page 236 of Bulletin 2 of the W. Va. Geological Survey, are given under **Mine No.** 217 in Table 3 at the end of this Chapter.

"Notes.—The coal was undercut in the bed and was shot down with black powder. The tipple was equipped with bar screens with 1½-inch and ⅞-inch openings. The coal was picked on the car by about four trimmers. The reported daily output in 1909 was about 1,000 tons and 1,300 tons was the capacity of the mine. The future output was to be derived largely from pillars. At this mine the bed lies nearly flat and has an average thickness of 3 feet 11 inches. Roof, hard, gray shale, or slate, 6 feet thick, capped with strongly bedded sandstone; floor, shale or gray, shaly underclay (fairly hard and smooth)."

BRIQUETTING TESTS.

The following briquetting tests of coal from Mine No. 217 on Map II (Jamestown No. 8 sample) are taken from pages 22-24 of Bulletin 385 of the U. S. Geological Survey:

"Sample consisted of two cars of semi-bituminous run-of-mine coal from a mine working the Quinnimont (Fire Creek) bed, Lawton, Fayette County, W. Va. on the Chesapeake and Ohio Railway.

"This coal was briquetted with binders as follows: Tests 263, 264, and 270 with flour binder alone; test 271 with water-gas pitch alone; and the remaining tests, Nos. 265, 266, 267, 268, and 269, with various mixtures of flour and water-gas pitch.

"All the briquets made with flour alone disintegrated very rapidly on exposure to the weather, and one sample (from test No. 270) crumbled to slack when handled after being immersed in water for twenty-four hours. The briquets made with 1 per cent. of flour binder were not strong enough to be satisfactory, but all the other briquets made with flour alone or with a mixture of flour and water-gas pitch stood the cohesion tests better than the briquets which had only water-gas pitch for a binder. A comparison of tests 267, 268, and 269 with test 271 shows that in the first three tests the drop and tumbler percentages are higher than in the fourth test. All briquets containing any flour soon became covered with a green mold when stored in a damp place and lost strength, but those stored in a dry place developed no mold, and even after eight months were apparently as good as when first made. In making briquets with flour alone, some difficulty was experienced from the briquets sticking to the dies of the press, but it is probable that when the conditions are better understood this trouble may be obviated. The briquets from test No. 268 were the strongest of the nine tests made on this coal, but those from test No. 269 were almost as strong. The briquets made with 7 per cent. of water-gas pitch alone (test No. 271) were of excellent quality, but were somewhat sticky when hot, although they loaded into the car direct from the machine with very little breakage. No samples were taken for sizing tests and chemical analyses from tests 263 to 270, inclusive, as all these tests were of a preliminary nature."

BRIQUET TESTS.

Test No.	263	264	270	265	266
Details of manufacture:					
Machine used	Am.	Eng	Am.	Eng	Eng.
Briquetting temperature °F.	198	201	....	201	....
Binder—					
Kind	Flour	Flour	Flour	Flour W. G. P.	Flour W. G. P.
Laboratory No. (see p. 8, Bull. 385)	6110	6110	6110	Fl. 6110 W. G. P. 5939	Fl. 6110 W. G. P. 5939
Amount Per cent.	1.0	2.0	4	1 Flour 3 W. G. P.	2 Flour 2 W. G. P.
Weight of—					
Fuel briquetted Pounds	500	500	500	500	500
Briquets, average Pounds	0.558	3.55	0.595	3.47	3.55
Heat value per pound—					
Coal as received B. T. U.	14,701	14,701	14,701	14,701	14,701
Binder B. T. U.	6,998	6,998	6,998	6,998 Fl. 16,781 W. G. P.	6,998 Fl. 16,781 W. G. P.
Moisture in briquet mixture Per cent.	....	....	7.29	....	....
Drop test (1-inch screen):					
Held Per cent.	65.5	60.2	79.5	60.2	76.1
Passed Per cent.	34.5	39.8	20.5	39.8	23.9
Tumbler test (1-inch screen):					
Held Per cent.	31.9	56.0	89.0	67.2	75.6
Passed Per cent.	68.1	44.0	11.0	32.8	24.4
Fines through 10-mesh sieve Per cent.	92.7	92.0	96.0	94.0	89.2
Weathering test:					
Time exposed days	132	132	132	132	132
Condition	E.	E.	E.	C.	D.
Water absorption:					
Time immersed days	8	9	1	8	4
Water absorbed Per cent.	5.94	9.76	10.60	9.31	10.29
Average for first four days Per cent.	1.53	2.44	(a)	2.31	2.57
Specific gravity (apparent)	1.222	1.184	1.079	1.168	1.157

a Sample crumbled after one day's immersion.

BRIQUET TESTS—(Continued).

Test No.	267.	268.	269.	271.
Size of coal as used:				
Over 1-4 inch. Per cent.	....	....	....	0.0
1-10 to 1-4 inch. Per cent.	....	....	....	9.3
1-20 to 1-10 inch. Per cent.	....	....	....	35.5
1-40 to 1-20 inch. Per cent.	....	....	....	29.2
Through 1-40 inch. Per cent.	....	....	....	28.0
Details of manufacture:				
Machine used	Am.	Am.	Am.	Am.
Briquetting temperature. °F.	....	....	....	196
Binder—				
Kind	Flour W. G. P.	Flour W. G. P.	Flour W. G. P.	W. G. P.
Laboratry No. (see p. 8, Bull. 385)	Fl. 6110 W. G. P. 5941	Fl. 6110 W. G. P. 5941	Fl. 6610 W.G.P. 5941	5941
Amount. Per cent.	2 Flour 2 W. G. P.	2 Flour 3 W. G. P.	2 Flour 2 W. G. P.	7
Weight of—				
Fuel briquetted. Pounds	500	500	500	81,250
Briquets, average. Pounds	0.562	0.588	0.562	0.633
Heat value per pound—				
Coal as received. B. T. U.	14,701	14,701	14 701	14,701
Briquets. B. T. U.	....	....	....	14,584
Binder. B. T. U.	....	....	....	16,978
Moisture in briquet mixture. Per cent.	....	6.29	5.72	5.21
Drop test (1-inch screen):				
Held. Per cent.	84.0	87.0	84.5	46.5
Passed. Per cent.	16.0	13.0	15.5	53.5
Tumbler test (1-inch screen):				
Held. Per cent.	81.0	91.0	88.0	58.0
Passed. Per cent.	19.0	9.0	12.0	42.0
Fines through 10-mesh sieve. Per cent.	95.7	96.7	97.0	95.5
Weathering test:				
Time exposed. days	132	132	132	127
Condition	E.	B.	C.	A.
Water absorption:				
Time immersed. days	4	5	4	12
Water absorbed. Per cent.	11.47	8.09	16.56	15.31
Average for first four days. Per cent.	2.87	2.00	4.14	3.56
Specific gravity (apparent)	1.150	1.196	1.087	1.100

Chemical Analysis of Briquets.

Test No.	271
Laboratory No.	5713
Proximate:	Per cent.
Moisture	3.28
Volatile matter	18.50
Fixed carbon	73.44
Ash	4.78
Sulphur	.84
Ultimate:	
Hydrogen	4.95
Carbon	82.26
Nitrogen	1.07
Oxygen	6.10

Extraction Analyses.

	Pitch.	Fuel.	Briquets.
		J-8.	Test 271.
Laboratory No.	5941	5575	5713
Volatilizing loss.......Per cent.	0	2.20	2.90
Extracted by CS_2:			
Air dried.......Per cent.	98.44	.534	4.94
As received.......Per cent.	98.44	.523	4.80
Pitch in briquet as received.......Per cent.	....	....	4.38

New River & Pocahontas Consolidated Coal Co. "Layland Mine No. 1"—No. 218 on Map II.

On east hillside of Chestnut Knob Fork, of Laurel, 1 mile south of Gentry; **Fire Creek Coal**; elevation, 2407′ L.

	Feet.	Inches.
Coal, 3′ 7¾″ to	4	2¾

The bed was measured and sampled at four points in No 1 mine by J. W. Groves and J. J. Rutledge, of the U. S. Geological Survey, on July 13, 1909, as given on pages 919 and 920 of Bulletin 22 of the U. S. Bureau of Mines.

Section A (sample 8346) was cut from the face of the main entry, 5,000 feet east of the drift mouth; thickness of bed, 3′ 7¾″; thickness of coal sampled, 3′ 3½″.

Section B (sample 8347) was cut from the face of left entry 9, [illegible],500 feet east of drift mouth; thickness of bed and of coal sampled, 3′ 8½″.

Section C (sample 8348) was cut from the face of room No. 14 on left entry 6, 2,400 feet east of the drift mouth; thickness of bed and of coal sampled, 4′ 2¾″.

Section D (sample 8349) was cut from the pillar of room 4 on left entry 4, 1,100 feet east of the drift mouth; this sample is of pillar coal; thickness of bed and of coal sampled, 3′ 10¼″.

A **composite sample** was made by mixing samples 8346, 8347, 8348, and 8349 for an ultimate analysis, the results of which are shown under laboratory **No. 8425.**

These 5 analyses, as taken from pages 227 and 228 of Bulletin 22 of the U. S. Bureau of Mines, together with an air-dried calculation of the composite sample (8425) as published by Dr. White under No. 12 on page 236 of Bulletin 2 of the W. Va. Geological Survey, are given under **Mine No.** 218 in Table 3 at the end of this Chapter.

"Notes.—See 'Notes' under description of Mine No. 220 on Map II."

New River & Pocahontas Consolidated Coal Co. "Layland Mine No. 2"—No. 219 on Map II.

On east hillside of Chestnut Knob Fork, 0.5 mile south of Gentry; **Fire Creek Coal**; elevation, 2447′ L.

	Feet.	Inches.
Coal, 3′ 10″ to....................................	4	1¼

The bed was measured and sampled at four points in No. 2 mine by J. W. Groves and J. J. Rutledge of the U. S. Geological Survey, on July 13, 1909, as given on pages 919 and 920 of Bulletin 22 of the U. S. Bureau of Mines.

Section A (sample 8234) was cut from the face of the main heading, 5,300 feet northeast of the drift mouth; thickness of bed and of coal sampled, 4′ 1¼″.

Section B (sample 8235) was cut from pillar of left entry 5, 2,500 feet west of the drift mouth; thickness of bed and of coal sampled 3′ 10″.

Section C (sample 8236) was cut from the face of left entry 10, 5,200 feet west of the drift mouth; thickness of bed 3′ 9¾″; thickness of coal sampled, 3′ 9¼″.

Section D (sample 8237) was cut from the face of room 16, on right entry 5; thickness of bed and of coal sampled, 3′ 10″.

A **composite sample** was made by mixing samples 8234, 8235, 8236, and 8237 for an ultimate analysis, the results of which are shown under laboratory **No. 8298.**

These 5 analyses, as taken from pages 227 and 228 of Bulletin 22 of the U. S. Bureau of Mines, together with an air-dried calculation of the composite sample (8298) as published by Dr. White under No. 13 on page 236 of Bulletin 2 of the W. Va. Geological Survey, are given under **Mine No. 219** in Table 3 at the end of this Chapter.

"Notes.—For Notes, see description of Mine 220 on Map II."

New River & Pocahontas Consolidated Coal Co. "Layland No. 3 Mine"—No. 220 on Map II.

On east hillside of Chestnut Knob Fork of Laurel, at Gentry; **Fire Creek Coal**; elevation, 2489′ L.; section as measured and sampled (No. 8350) by J. W. Groves and J. J. Rutledge, of the U. S. Geological Survey, on July 13, 1909, being cut from the face of the main entry, 2,400 feet east of the drift mouth, all but the top 2 inches being included in the sample; published on page 920 of Bulletin 22 of the U. S. Bureau of Mines.

			Feet.	Inches.
Shale, strong, gray, roof				
Coal, and shale (thin layers)	0′	2″		
Coal	2	9¾		
Mother coal	0	0¼		
Coal	0	4	3	4
Floor, hard, gray underclay				

The analysis of sample (No. 8350) collected by Messrs. Groves and Rutledge, as taken from page 228 of Bulletin 22 of the U. S. Bureau of Mines, together with an air-dried calculation of the same as published by Dr. White under No. 14 on page 236 of Bulletin 2 of the W. Va. Geological Survey, is given under **Mine No. 220** in Table 3 at the end of this Chapter.

"Notes.—(Applying in part to Mines Nos. 1 and 2 also—Nos. 218 and 219 on Map II).—The coal was undercut by hand, and generally shot down with black powder. The three mines used the same tipple and were to connect underground in the future, eventually making one mine. The loading house was constructed of steel, and was equipped with bar screens with 3-inch, 1½-inch, and ¾-inch spaces, making it possible to load four sizes of coal, including run-of-mine. The coal in 1909 was all loaded in run-of-mine form. It was picked on the conveyer and on the cars. The capacity of Layland No. 1 mine in 1909 was 700 tons, of No. 2 mine, 700 tons, and of No. 3, 40 tons, making a total capacity of 1,440 tons daily. The output was all to be derived from advance workings, since the mines were all new. The output was likely to be largely and rapidly increased. Thickness, uniform, ranging from 3 feet 6 inches to 4 feet 2 inches; roof, strong gray shale, which does not fall when the coal is mined; floor, hard gray underclay, with a smooth surface. The cover is from 50 to 600 feet."

The coal bed at the above mine was also measured and sampled at five points on March 19, 1915, by D. J. Parker, H. D. Jones, and R. H. Seip, of the U. S. Bureau of Mines, as given on pages 399-400 of Bulletin 123 of the latter Bureau, the analyses being published on page 117.

Section A (sample 21502) was cut on left rib, 3 left entry, tunnel entry, just in-by last break-through; thickness of bed, 2″ 8½″; thickness of coal sampled, 2′ 7½″.

Section B (sample 21503) was cut on left rib of tunnel entry, 6 feet from face; thickness of bed, 4 0″; thickness of coal sampled, 3′ 10″.

Section C (sample 21504) was cut at a point 6 feet from face of 6 left entry, No. 4 mine, on in-by corner of last break-through; thickness of bed and of coal sampled, 4′ 0″.

Section D (sample 21505) was cut at a point 50 feet from face of main heading, at in-by corner of last break-through; thickness of bed, 3′ 6½″; thickness of coal sampled, 3′ 5½″.

Section E (sample 21506) was cut at a point 75 feet from face of 10 left entry, on left rib; thickness of bed and of coal sampled, 3′ 10″.

The ultimate analysis of a composite sample made by combining face samples 21502 to 21506 is given under laboratory **No. 21507.**

These 6 analyses are given under **Mine No. 220** in Table 3 at the end of this Chapter.

"Notes.—Thickness 3 to 4½ feet. Roof, generally a hard, gray shale rather variable, and containing numerous slips; floor, smooth, hard underclay. Cover, about 200 feet. In 1915 main triple entries had been driven to the rise on the strike of the bed at a bearing of N. 80° E. and had been advanced a distance of 7,300 feet. Twelve pairs of double butt entries were driven off at intervals of 500 feet to the left at right angles from the main entries. At 700 feet from drift mouth the so-called 'tunnel' entries were driven off to the left of the mine entries. The coal was all mined by pick, being 'overcut' in the top coal and then blasted down with black blasting powder by the miners during the shift. The daily output from the No. 3 mine was about 750 tons. There were also two other mines in practically the same operation, Layland Nos. 1 and 2."

Hemlock Hollow Coal & Coke Co. Drift Opening—
No. 562 on Map II.

On north bank of Laurel Creek and road, opposite Sandlick Branch; **Fire Creek Coal**; elevation, 2496′ L.; examined by author.

	Feet.	Inches.
Shale, bluish-black	2	0
Coal, medium-hard (slate floor)	3	2

Coal Prospect—No. 563 on Map II.

On north bank of Laurel Creek, ½ mile northeast of mouth of Pond Branch; **Fire Creek Coal**; elevation, 2485′ B.; examined by author.

	Feet.	Inches.
Coal, soft, opening closed, 15″ visible of top portion of bed	1	3
Concealed by water, shale, buff, sandy, visible	3	0

Coal Prospect—No. 564 on Map II, on north bank of Laurel Creek, 0.65 mile northeast of mouth of Pond Branch, in the **Fire Creek Coal**, at an elevation of 2520′ B., as determined by the author, was closed and thickness of bed not learned.

Coal Prospect—No. 565 on Map II, on south hillside of Laurel Creek, ¾ mile due east of mouth of Pond Branch, in the **Fire Creek Coal**, at an elevation of 2545′ B., as determined by the author, was closed.

Coal Opening—No. 566 on Map II.

On point between Quinton and Old Schoolhouse Branches, 0.8 mile S. 50° W. of Sievy Bridge; **Fire Creek Coal**; elevation, 2910′ B.; examined by author.

	Feet.	Inches.
Upper Raleigh Sandstone and concealed to ridge summit just southwest of cemetery	95	0
Concealed in flat bench along point	25	0
Sandstone and concealed, steep slope	75	0
Concealed in flat bench on point	20	0
Sandstone, grayish-white, hard, laurel thicket on crop	60	0
Slight bench	10	0
Concealed in steep slope	93	0
Coal, Fire Creek, 1′ 8″ to	2	0

Reported by Jas. Gilkeson as best coal for domestic fuel in region and 20″ thickness of clean medium-soft coal.

J. W. Crookshank Coal Opening—No. 567 on Map II.

In edge of Greenbrier County, 0.4 mile northwest of summit of [illegible] Knob; **Fire Creek Coal**; elevation, 3310′ B.; examined by author.

	Feet.	Inches
Black shale, visible	0	4
Coal, soft	1	1
Concealed by water		

Wm. Sims Coal Opening—No. 568 on Map II.

In edge of Greenbrier County, 0.4 mile west of summit of Boggs Knob; **Fire Creek Coal**; elevation, 3310′ B. and closed; examined by author.

	Feet.	Inches.
Coal, reported by Mrs. Lura Neff, with black slate roof and a thickness of 12″ to................	1	3

Quantity of Fire Creek (Quinnimont) Coal Available.

Based on all the data in hand and that included on preceding pages and a planimetric determination by A. M. Hagan from Map II of the minable area of the Fire Creek Coal as limited on Figure 21, the following estimate is made by the author of the probable available tonnage of this bed:

Probable Amount of Fire Creek (Quinnimont) Coal.

District.	Thickness of Coal Assumed Feet.	Square Miles.	Acres.	Cubic Feet of Coal.	Short Tons. of Coal.
Sewell Mountain...	3.0	76.90	49,216.0	6,431,546,880	257,261,875
Fayetteville	3.5	23.03	14,739.2	2,247,138,432	89,885,537
Quinnimont	3.5	24.52	15,692.8	2,392,524,288	95,700,972
Totals for County.......		124.45	79,648.0	11,071,209,600	442,848,384

MINABLE COALS OF THE POCAHONTAS GROUP, POTTSVILLE SERIES.

Only two coals of the six recognized for the Pocahontas Group of the Pottsville Series appear to attain minable development, as shown on Figure 4, page 387; viz, the No. 6 Pocahontas and No. 3 Pocahontas. These two will now be described in the order named.

THE NO. 6 POCAHONTAS COAL

The No. 6 Pocahontas Coal, described briefly in Chapter VIII, pages 327-8, appears to attain minable development over a considerable area in the southeast border of Sewell Mountain District and in the eastern half of Quinnimont District, as shown by the shaded region on Figure 22. In other portions of the County it is apparently too thin and irregular to warrant its classification there as minable. Its detailed outcrop is shown on Map II only in the regions that it is believed to attain minable dimensions and regularity. It is this bed that is mined commercially at Mine No. 222 on Map II, near the extreme eastern point of Sewell Mountain District, 1 mile northward from Rainelle, this being the only commercial operation on this bed in Fayette or the adjoining portions of the immediately surrounding counties. The following average results, compiled by R. C. Tucker from 11 different analyses of samples collected mostly in the southern Counties of the State, details of which were published in previous State Survey Reports, give a fair idea of its chemical composition.

	Per cent.
Moisture	0.66
Volatile Matter	17.16
Fixed Carbon	76.23
Ash	5.95
Total	100.00
Sulphur	0.74

For special analyses in Fayette, the reader is referred to Nos. 222-4 in Table 1 at the end of this Chapter.

Sewell Mountain District.

In Sewell Mountain District, the No. 6 Pocahontas Coal, in minable development, appears to be confined to a strip about two miles in width and eight to ten miles in length in the southeastern border, as shown by the shaded region on Figure 22, as determined from all the data in hand, including the logs of a large number of coal test borings. Its thickness and stratigraphic position are shown in the sections published

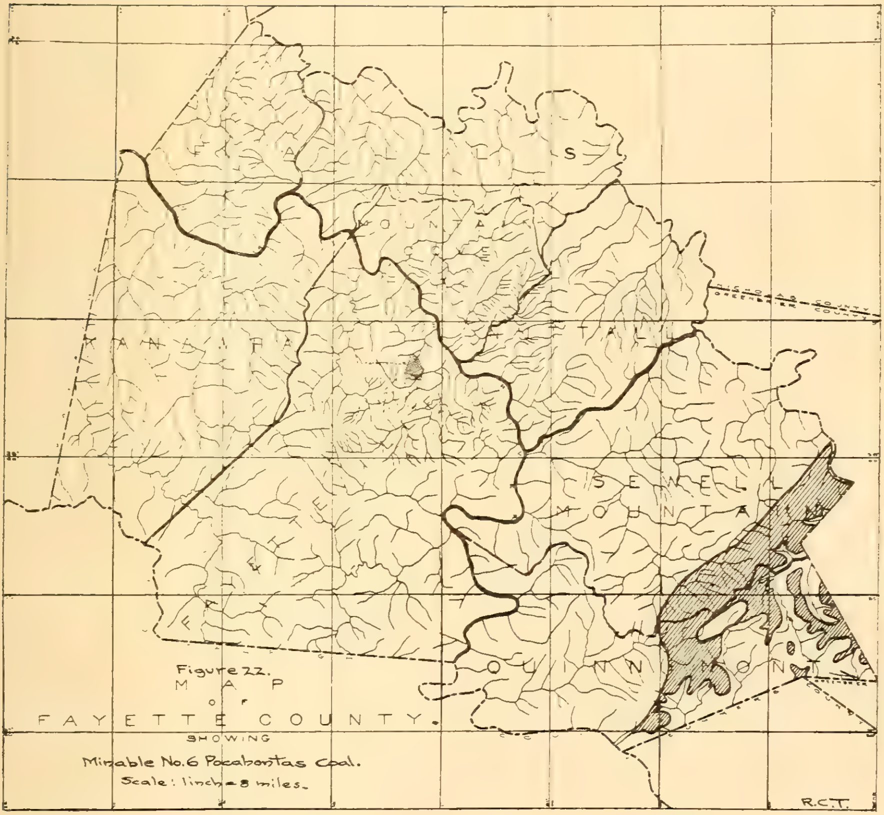

Figure 22.
MAP
of
FAYETTE COUNTY.
SHOWING
Minable No. 6 Pocahontas Coal.
Scale: 1 inch = 8 miles.

in Chapter IV for Manns Creek, Sewell, Beury, Royal, Maywood, Sims Schoolhouse and Sievy Bridge Station, page references to which are given in the Index. Its description at the one commercial mine and other exposures follows.

Meadow River Smokeless Coal Co. (Formerly J. W. Dwyer) Mine—No. 222 on Map II.

Just in edge of Greenbrier County, south sillside of Meadow River, 1 mile N. 20° E. of Rainelle; **No. 6 Pocahontas Coal**; elevation, 2605′ B.; section and sample by author at rib at starting point of crop entry off 1st Left.

	Feet.	Inches.
1. Slate, black		
2. Slate, black, harder, cannelly, usually draw slate	0	8
3. **Coal**, soft, clean (slate, black, floor)	3	8

This mine was opened by J. W. Dwyer in 1914 who operated it until May, 1916; principal office, Rainelle, W. Va.; lease of Meadow River Lumber Co.; output, 100 tons, 9-hour day; men employed, 25 inside and 5 outside; ship run-of-mine coal only and mostly for steam purposes, both east and west, and gives perfect satisfaction; rises rapidly southeast; J. M. Suttle, Foreman, authority for mine data.

The analysis of a sample (926H) collected from No. 3 of the above section by the author, as reported by Messrs. Hite and Krak, is given under **Mine No. 222** in Table 1 at the end of this Chapter.

Meadow River Lumber Co. (Abandoned) Opening—No. 569 on Map II.

On east bank of branch of Meadow River, 1.8 miles N. 15° W. of Rainelle; **No. 6 Pocahontas Coal**; elevation, 2520′ B.; examined by author.

	Feet.	Inches.
Coal, clean, opening abandoned, reported by Geo. Myles of Clifftop according to W. F. Hall, Superintendent of Meadow River Smokeless Coal Co.	4	0

Formerly supplied domestic fuel for farmers in Maywood region; for stratigraphic position see Maywood—Aldrich Camp Section, page 203.

Coal Prospect—No. 570 on Map II.

In hill road, 1 mile west of Rainelle; **No. 6 Pocahontas Coal;** elevation, 2715′ B.; opening closed; section by author from coal exposure.

			Feet.	Inches.
Shale, dark and buff, siliceous, interlaminated..			20	4
Coal, slaty........................	1′	2″		
Shale, gray, argillaceous...........	1	4		
Coal, slaty..........................	0	5		
Shale, gray..........................	0	3		
Coal, soft...........................	1	0		
Coal, slaty........................	0	6	4	8
Fire clay shale, gray...........................			5	0

The stratigraphic position of **Coal Exposure—No. 571 on Map II,** on west hillside of Sewell Creek, 0.4 mile N. 45° W. of Sievy Bridge, in the No. 6 Pocahontas Coal, at an elevation of 2775′ B., is shown in the Sievy Bridge Station Section, page 205.

Quinnimont District.

In Quinnimont District, the No. 6 Pocahontas Coal, in minable development, is confined to the eastern half, as shown on Figure 22. In the western half, it appears to be too thin and irregular to be of any economic importance, although frequently present at its proper horizon. Its thickness and stratigraphic position in the District as a whole and in the immediately adjoining region are exhibited in the sections published in Chapter IV for Royal, Lawton—½ Mile Southwest, Meadow Creek Station, Beurytown, Walnut Flat Schoolhouse, Boggs Knob—Sims Station, Turniphole Mountain—½ Mile Northwest, and Turniphole Mountain, page references to which are given in the Index; and in the logs of Coal Test Borings Nos. 124-148 on Map II, also referenced in Index and listed in the table of boring records at the beginning of this Chapter, page 388C. Although it has not been mined commercially in Quinnimont, yet it attains a fine development here and has been prospected quite extensively by large landholding companies and by natives for local domestic fuel. Its description at these diggings and other exposures follows.

Coal Prospect--No. 572 on Map II.

On east hillside of Quinton Branch, 0.7 mile S. 15° W. of Sievy Bridge; **No. 6 Pocahontas Coal**; elevation, 2877' L.; examined by author.

			Feet.	Inches.
Shale, buff, sandy, visible			1	0
Coal, soft, columnar	4'	2"		
Slate, black, pavement	0	6		
Coal, reported	1	0	5	8

The following section is reported by Anderson M. Fleshman at the above opening:

			Feet.	Inches.
Coal	4'	2"		
Bone, 4" to	0	6		
Coal	0	8	5	4

Coal Prospect—No. 573 on Map II.

On east side of road, 1.5 miles N. 50° W. of Springdale; **No. 6 Pocahontas Coal**; elevation, 3055' B.; examined by author.

	Feet.	Inches.
Sandstone, coarse, brown, visible	3	0
Coal, soft, brown, columnar (slate, pavement)	3	2

W. H. Sims Coal Opening—No. 574 on Map II.

In Greenbrier County, on east side of Sims Mountain, 0.4 mile southwest of Sims Schoolhouse; **No. 6 Pocahontas Coal**; elevation, 2910' B.; dips west; section at entrance, by author.

			Feet.	Inches.
Coal, soft, (sandstone, flaggy, roof)	0'	9"		
Bony slate, 0" to	0	2		
Coal, soft, (slate, black, pavement)	2	6	3	5

Mr. Sims says he never penetrated below the black slate pavement, so that the other bench may be present.

Coal Opening (Closed)—No. 575 on Map II, in Greenbrier County, on east side of hill road, 1.2 miles S. 70° E. of Rainelle, in the No. 6 Pocahontas Coal, at an elevation of 2790' B., was closed and the thickness of the bed not learned

Coal Exposure—No. 576 on Map II.

In road on Fayette-Greenbrier County Line, 2¼ miles N. 75° E. of Springdale; **No. 6 Pocahontas Coal**; elevation, 3060′ B.; used in Turniphole Mountain—½ Mile Northwest Section, page 219; examined by author.

	Feet.	Inches.
Shale, black, **Royal, Lingula fossils** abundant...	9	0
Coal, soft....................................	4	0
Shale, dark and gray.........................	10	0

Bert Hutsenpiller Coal Opening—No. 577 on Map II.

On southwest slope of Turniphole Mountain, 2½ miles due east of Springdale; **No. 6 Pocahontas Coal**; elevation, 3065′ B.; used in Turniphone Mountain Section, page 220; section at face about 300 feet in, by author.

			Feet.	Inches.
1. Shale, medium-hard, gray, roof..............				
2. **Coal,** soft.......................	4′	0″		
3. Slate, dark-gray, **coal** streaks, 12″ to.......................	1	4		
4. **Coal,** soft, bright (slate floor)..	1	0	6	4

No. 4 was not seen, but I. A. Callison, a miner, one of three now mining coal here for domestic use, says he blew up the bottom slate No. 3 at one point and found 12 inches of soft, bright coal under it.

P. T. Hurley Coal Opening—No. 578 on Map II.

On Greenbrier-Summers County Line, on north slope of Irish Mountain; **No. 6 Pocahontas Coal**; elevation, 3150′ B.; section reported by J. E. Hurley; opening partly closed but examined by author.

			Feet.	Inches.
Coal, soft........................	0′	6″		
Bone	0	4		
Coal, soft (slate floor).............	3	0	3	10

Beury Bros. Coal Prospect—No. 579 on Map II.

On head of branch of Lefthand Branch, 2 miles N. 75° W. of Springdale; **No. 6 Pocahontas Coal**; elevation, 3045′ L.

	Feet.	Inches.
Coal, prospect closed, but had practically the same bed section as at Mine No. 580 on Map II, says Milton E. Walker....................	3	10

Milton E. Walker Coal Prospect—No. 580 on Map II.

0.4 mile west of No. 579; **No. 6 Pocahontas Coal**; elevation, 2993′ L.; opening closed by water; section by Mr. Walker; examined by author.

			Feet.	Inches.
Shale, dark, sandy, visible			5	0
Coal, soft	0′	6″		
Bone, hard	0	4		
Coal, soft (slate floor)	3	0	3	10

New River & Pocahontas Consolidated Coal Co. Prospect—No. 581 on Map II.

On head of branch of Lefthand Branch, 2 miles N. 75° W. of Spring-Springdale; **No. 6 Pocahontas Coal**; elevation, 2916′ L.; examined by author.

			Feet.	Inches.
Shale, sandy, roof				
Coal, soft	3′	0″		
Bone, visible	0	3		
Concealed to pavement	3	0	6	3

Mr. James Gilkeson says the total thickness of the bed at the above prospect was about 7 feet and that it had about 1 foot of bone.

Coal Prospect—No. 582 on Map II, on head of branch of Lefthand Creek, 0.1 mile northwest of No. 581, in the **No. 6 Pocahontas Coal,** at an elevation of 2910′ L., as determined by the author, was closed and the thickness of the bed not learned.

Coal Prospect—No. 583 on Map II.

On north hillside of branch of Lefthand Creek, 0.9 mile westward from No. 581; **No. 6 Pocahontas Coal**; elevation, 2763′ L.; examined by author.

				Feet.	Inches.
Shale, buff, sandy, visible	5′	0″	Royal.	6	0
Shale, black	1	0			
Coal, soft	0′	6″			
Bone, 2″ to	0	3			
Coal, soft	2	6			
Coal and concealed by water	1	0		4	3
Slate pavement					

New River & Pocahontas Consolidated Coal Co. Prospect—No. 584 on Map II.

On west hillside of Lefthand Creek, 0.35 mile N. 75° E. of Walnut Flat School; **No. 6 Pocahontas Coal**; elevation, 2665′ B.; examined by author.

	Feet.	Inches.
Coal, prospect closed, reported about 6 feet thick with 12 inches of bone 2″ to 4″ below top by Chas. D. Fox	6	0

New River & Pocahontas Consolidated Coal Co. Prospect—No. 585 on Map II.

On west hillside of Lefthand Creek, ¾ mile south of Walnut Flat School; **No. 6 Pocahontas Coal**; elevation, 2778′ L.; used with description of Royal Shale, page 326; examined by author.

			Feet.	Inches.
Shale, black, argillaceous, **Royal**, Lingula fossils abundant			6	0
Coal, soft, 6″ to	0′	7″		
Bone, hard, 3″ to	0	4		
Coal, soft	3	2	4	1
Slate, black, hard, pavement				

Coal Prospect—No. 586 on Map II.

On point, 1 mile due west of Meadowbridge (Clute P. O.); **No. 6 Pocahontas Coal**; elevation, 2973′ L.; section reported by Anderson M. Fleshman; correlation verified by author.

			Feet.	Inches.
Coal	2′	10″		
Bone	0	6		
Coal	1	0	4	4

Coal Prospect—No. 587 on Map II.

On east side of road, 1.8 miles due west of Meadowbridge (Clute P. O.); **No. 6 Pocahontas Coal**; elevation, 2731′ L.; interval to top of Pineville Sandstone cliff, 140 feet; examined by author.

	Feet.	Inches.
Coal, prospect closed, props 3′ to	4	0

New River & Pocahontas Consolidated Coal Co. Opening—No. 223 on Map II.

On branch of Beelick, 1.7 miles N. 35° W. of Meadowbridge (Clute P. O.); **No. 6 Pocahontas Coal**; elevation, 2745′ B.; examined by author.

			Feet.	Inches.
1. Shale, dark, sandy, visible			2	0
2. **Coal**, soft, columnar, 4″ to	0′	6″		
3. **Coal**, gray, hard, bony, 3″ to	0	5		
4. **Coal**, soft, columnar, (slate, black, floor)	3	2	4	1

No. 3 of section is 5″ thick at entry and 25′ in at face where sample was taken it is only 3 inches. The analysis of a sample (924-H) collected by the author from Nos. 2 and 4 of section, as reported by Messrs. Hite and Krak, is given under **Mine No. 223** in Table 1 at the end of this Chapter.

Coal Prospect—No. 588 on Map II.

On east edge of road, 2.1 miles due west of Meadowbridge (Clute P. O.); **No. 6 Pocahontas Coal**; elevation, 2697′ L.; used in Beurytown Section, page 215; opening closed; section by author on side of cut.

	Feet.	Inches.
Shale, sandy, buff and brown, visible	6	0
Coal, soft, columnar (slate, black, floor)	3	3

Coal Opening—No. 589 on Map II.

On east hillside of Beelick Branch of Meadow Creek, 0.2 mile south of Eburnean Schoolhouse; **No. 6 Pocahontas Coal**; elevation, 2632′ L.; section at entrance by author.

			Feet.	Inches.
1. Shale, dark, sandy, visible, with thin **coal** streaks and plant fossils abundant			6	0
2. **Coal**, soft, columnar	0′	6″		
3. **Coal**, bony, hard, 1″ to	0	2½		
4. **Coal**, soft, columnar	3	7		
5. Slate, black, **coaly**	0	4		
6. **Coal**, soft, (slate floor)	0	8	5	3½

This opening is driven in several hundred feet, a section on the rib about 250 feet in giving the following:

			Feet.	Inches.
1.	Shale, sandy, roof			
2.	**Coal**, soft	0′ 6″		
3.	Bone, hard, 2″ to	0 3		
4.	**Coal**, soft	3 6	4	3
5.	Slate, black, pavement			

The pavement in the latter section is the "slate, black, coaly," No. 5, of preceding section. This is probably the pavement in Mine No. 223, the bottom coal, No. 6, not being seen. This opening (No. 589) furnishes coal for domestic fuel for the neighborhood.

Coal Prospect—No. 590 on Map II, on west hillside of Beelick Branch of Meadow Creek, 0.2 mile south of Eburnean Schoolhouse, in the **No. 6 Pocahontas Coal,** at an elevation of 2607′ L., as determined by the author, was closed and thickness of bed not learned.

New River & Pocahontas Consolidated Coal Co. Prospect—No. 591 on Map II.

On west hillside of Beelick Branch of Meadow Creek, 1.5 miles N. 15° W. of Beurytown; **No. 6 Pocahontas Coal**; elevation, 2630′ B. Section reported by Mr. George Fox who aided in the prospecting for this company.

	Feet.	Inches.
Coal, clean	6	7

New River & Pocahontas Consolidated Coal Co. Prospect—No. 592 on Map II.

On point, ¾ mile N. 15° W. of Beurytown; **No. 6 Pocahontas Coal**; elevation, 2730′ L.; section reported by Mr. George Fox.

	Feet.	Inches
Coal, clean	3	10

Mr. Fox reports that northeast of the S. Gwinn Opening (No. 224 on Map II) (see next opening below) along the crop to Prospect Opening No. 223, he made about 20 openings scattered along the crop and that the smallest showed a thickness of 3′ 10″ (No. 592), and the largest, 6′ 7″ (No. 591).

Samuel Gwinn Coal Opening—No. 224 on Map II.

On north hillside of Meadow Creek, 1.5 miles due north of Meadow Creek Station; **No. 6 Pocahontas Coal**; elevation, 2683′ L. Used in Meadow Creek Station Section, page 214.

	Feet.	Inches.
1. Sandstone, visible, gray, hard, makes roof...	4	0
2. Coal, soft, columnar (slate floor) 4′ 6″ to .	5	0

The analysis of a sample (923-H) collected by the author from No. 2 of the above section, as reported by Messrs. Hite and Krak, is given under **Mine No. 224** in Table 1 at the end of this Chapter.

New River & Pocahontas Consolidated Coal Co. Coal Prospect—No. 593 on Map II.

On north hillside of New River, southwest of Harrah Schoolhouse, 1.1 miles southeast of Backus; **No. 6 Pocahontas Coal**; elevation, 2477′ L.

	Feet.	Inches.
Coal, prospected by George Fox, who reports the coal no good northwest of the Samuel Gwinn Opening (No. 224 on Map II), along its crop, being slaty and ranging from 6″ to...........	2	0

Quantity of No. 6 Pocahontas Coal Available.

Based on all the evidence in hand and a planimetric determination by A. M. Hagan from Map II of the minable area as limited on Figure 22, the following estimate is made by the author of the probable available tonnage of the No. 6 Pocahontas Coal:

Probable Amount of No. 6 Pocahontas Coal.

District.	Thickness of Coal Assumed Feet.	Square Miles.	Acres.	Cubic Feet of Coal.	Short Tons of Coal.
Sewell Mountain.....	3.5	15.24	9,753.6	1,487,033,856	59,481,354
Quinnimont	4.0	14.62	9,356.8	1,630,328,832	65,213,154
Totals for County........		29.86	19,110.4	3,117,362,688	124,694,508

THE NO. 3 POCAHONTAS COAL.

The No. 3 Pocahontas Coal, described briefly in Chapter VIII, page 329, in minable development, like the No. 6 Pocahontas bed, appears to be confined to the southeastern margins of Sewell Mountain and Quinnimont Districts as shown in detail on Figure 23. In other regions of the County it seems too thin and irregular to be classed as minable. Its detailed outcrop is exhibited on Map II. It has not been mined commercially in Fayette or in the adjoining portions of the immediately surrounding Counties, but it has been prospected to some extent by the large land-holding companies and by natives for local domestic fuel, especially by the latter on the high ridge immediately northeast of Meadowbridge (Clute P. O.). The following average results, compiled by R. C. Tucker from 168 different samples collected mostly from commercial mines in McDowell, Mercer, and Wyoming Counties, details of which were published in previous State Survey Reports, should give a fair idea of the composition and calorific value of the bed:

	Per cent.
Moisture	0.55
Volatile Matter	15.88
Fixed Carbon	78.93
Ash	4.64
Total	100.00
Sulphur	0.63
Phosphorus	0.007
Calorimeter B. T. U. 15,070	

No. 225 in Table 1 at the end of this Chapter, representing the only sample collected from this bed in Fayette County, shows a slightly higher percentage of volatile matter and is correspondingly lower in fixed carbon than the above average for 168 samples in the southern portion of the State, a feature that is characteristic of the Pottsville Coals, in that they tend to increase in volatile and decrease in fixed carbon northeastward from the southern edge of the State.

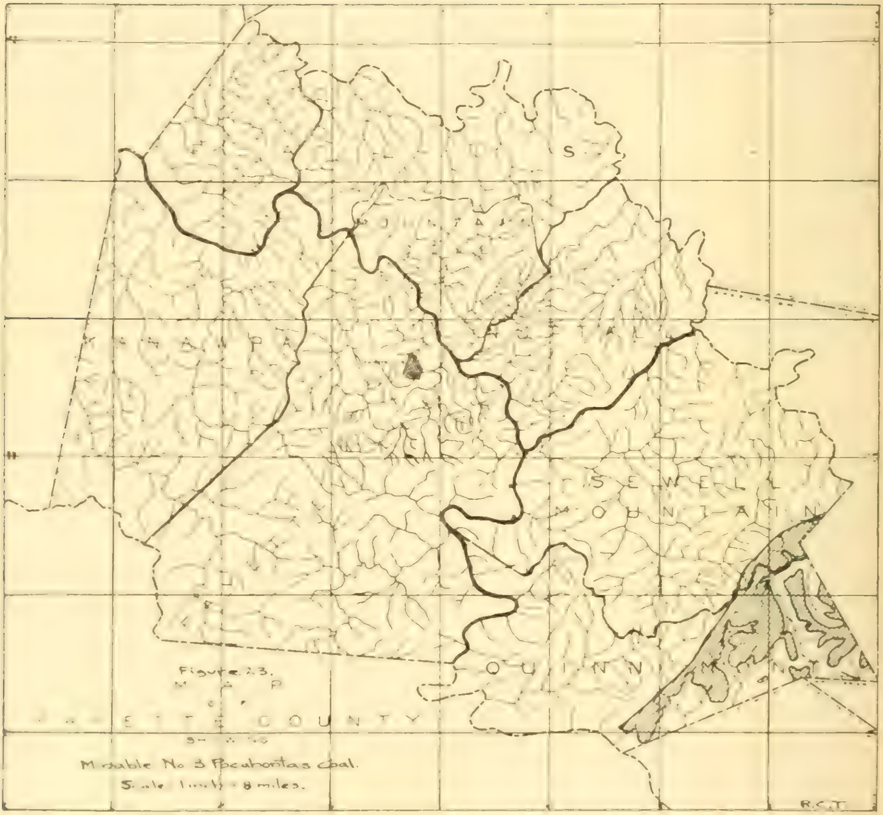

Figure 23.
MAP
of
FAYETTE COUNTY
showing
Minable No 3 Pocahontas Coal.
Scale 1 inch = 8 miles.

Sewell Mountain District.

In Sewell Mountain District, the thickness and stratigraphic position of the No. 3 Pocahontas Coal are exhibited in the Sievy Bridge Station Section in Chapter IV, page 205; and in the log of Coal Test Boring No. 113 on Map II, page 443, permission for publication of the thickness in the boring not being granted. As shown on Figure 23, its minable area appears to be confined to the waters of Sewell Creek in the southeastern margin of the District. Its description in the latter as a whole at prospect openings and an exposure follows.

Coal Prospect—No. 594 on Map II.

On south hillside of Meadow River, directly north of Mine No. 222 in No. 6 Pocahontas Coal; **No. 3 Pocahontas Coal**; elevation, 2530′ B.; examined by author.

	Feet.	Inches.
Coal, reported clean and soft by J. M. Suttle, with thickness of only	1	0

Coal Exposure—No. 595 on Map II.

In hill road, 0.8 mile west of Rainelle; **No. 3 Pocahontas Coal**; elevation, 2655′ B.; examined by author.

	Feet.	Inches.
Shale, buff, sandy	19	0
Coal, soft	0	11
Shale sandy	15	0

Meadow River Lumber Co. Prospect—No. 596 on Map II.

In ravine on west hillside of Sewell Creek 0.3 mile northwest of Sievy Bridge; **No. 3 Pocahontas Coal**; elevation, 2665′ B.; used in Sievy Bridge Station Section, page 205. Nos. 4, 5, 6, and 7 of section were concealed by water, but their thicknesses were supplied by Geo. W. Sevy, a native, who measured it once with a square; coal dips northwest; examined by author.

				Feet.	Inches.
1.	Sandstone			5	0
2.	**Coal**, soft	1′	3 ″		
3.	Slate, black, ¼″ to	0	0½		
4.	**Coal**, soft, 24″ to	2	2½		
5.	Bone, 6″ to	0	8		
6.	**Coal**, soft, 4″ to	0	6	4	8
7.	Slate				

Quinnimont District.

In Quinnimont District and the immediately surrounding region the thickness and stratigraphic position of the No. 3 Pocahontas Coal are exhibited in the sections published in Chapter IV for Grandview—Royal, Quinnimont—North Side, Beurytown, Boggs Knob—Sims Station, and Turniphole Mountain, page references to which are given in the Index; and in the logs of Coal Test Borings listed for this District in the table at the beginning of this Chapter, page 388C. As shown on Figure 23, this bed appears to attain minable development on the waters of Meadow and Sewell Creeks, where it has been opened to some extent by natives for local domestic fuel and prospected by large land-holding companies. Its description at these diggings and other exposures follows.

Coal Exposure—No. 597 on Map II.

In ridge road 1 mile N. 45° W. of Springdale; **No. 3 Pocahontas Coal**; elevation, 3020′ B.; examined by author.

			Feet.	Inches.
Sandstone, coarse, friable, visible			15	0
Coal, soft	1′	10″		
Shale, gray	0	2		
Coal, slaty (slate floor)	0	3	2	3

Coal Exposure—No. 598 on Map II.

In hill road, 1.7 miles S. 30° E. of Springdale, east side of Irish Mountain; **No. 3 Pocahontas Coal**; elevation, 3090′ B.; examined by author.

	Feet.	Inches.
Coal, visible, 2′ 0″ to	3	0

A. J. Walkup Coal Opening—No. 599 on Map II.

On Patterson Mountain, 1.3 miles N. 70° E. of Meadowbridge (Clyde P. O.); **No. 3 Pocahontas Coal**; elevation, 3035′ B.; examined by author.

	Feet.	Inches.
Sandstone roof		
Coal, soft (shale, gray, floor)	2	6

Coal Opening (Closed)—No. 600 on Map II.

On northwest side of Patterson Mountain, 0.8 mile N. 70° E. of Meadowbridge (Clute P. O.); **No. 3 Pocahontas Coal**; elevation, 3005′ B.; examined by author.

	Feet.	Inches.
Coal opening closed reported by A. J. Walkup to have a thickness of	3	0

Beury Bros. Coal Prospect—No. 225 on Map II.

On north hillside, 1.8 miles N. 20° E. of Meadowbridge (Clute P. O.); **No. 3 Pocahontas Coal**; elevation, 2942′ L.; examined by author.

	Feet.	Inches.
1. Sandstone, coarse, brown, visible	15	0
2. **Coal**, soft	2	1
3. Shale, gray	1	0

The analysis of a sample (927-H) collected by the author from No. 2 of above section, as reported by Messrs. Hite and Krak, is given under **Mine No. 225** in Table 1 at the end of this Chapter.

Gertrude Lacy Coal Opening—No. 601 on Map II.

On branch of Lefthand Creek, 0.1 mile northwest of Mine No. 225 on Map II; **No. 3 Pocahontas Coal**; elevation, 2940′ B.; opening closed; section as reported by Milton E. Walker; examined by author.

			Feet.	Inches.
Coal	0′	3″		
Bone	0	2		
Coal	2	3	2	8

Coal Exposure—No. 602 on Map II.

Edge of hill road, north side of Laurel Creek, 0.4 mile N. 70° E. of Lawton; **No. 3 Pocahontas Coal**; elevation, 2180′ B.; examined by author.

			Feet.	Inches.
Sandstone, **Upper Pocahontas**, grayish-white, pebbly, current-bedded, making cliff, 60′ to			70	0
Coal, soft	0′	8″		
Slate, black, **coal** streak	0	7		
Coal, soft	0	6		
Coal, slaty (slate floor)	0	3	2	0

Coal Exposure—No. 603 on Map II.

Along railway incline, east hillside of Chestnut Knob Fork, 0.6 mile northeast of Lawton; **No. 3 Pocahontas Coal**; elevation, 2145′ B.; examined by author.

			Feet.	Inches.
Sandstone			10	0
Coal	0′	7″		
Slate, black	0	6		
Coal (slate floor)	0	11	2	0

Quantity of No. 3 Pocahontas Coal Available.

Based on all the evidence in hand and a planimetric determination by A. M. Hagan of the minable area from Map II, as limited on Figure 23, the following estimate is made by the author of the probable available tonnage of No. 6 Pocahontas Coal in Fayette County:

Probable Amount of No. 3 Pocahontas Coal.

District.	Thickness of Coal Assumed. Feet.	Square Miles.	Acres.	Cubic Feet of Coal.	Short Tons of Coal.
Sewell Mountain.....	2.5	2.34	1,497.6	163,088,640	6,523,545
Quinnimont	3.0	21.34	13,657.6	1,784,775,168	71,391,007
Totals for County.........		23.68	15,155.2	1,947,863,808	77,914,552

On preceding pages of this Chapter there is given at the end of the description of each of the 20 minable coal beds an estimate of the available tonnage of each by magisterial districts along with the total for the County. The following table, with the coals arranged in descending order, gives a summary of these statements:

Summary of Available Coal by Districts.

Coal Bed.	Falls.	Fayetteville.	Kanawha.	Mountain Cove	Nuttall.	Quinnimont.	Sewell Mountain.	Totals.
Middle Kittanning (North Coalburg)	5,798,706	....	4,460,544	....	....	....	....	10,259,250
No. 5 Block (Lower Kittanning)	45,274,522	....	16,225,229	446 054	....	....	....	61,945,805
Stockton	40,680,161	696,960	29,261,169	1,103,985	....	....	....	71,742,275
Coalburg	68,145,961	....	44,337,809	3,010,867	....	....	....	115,494,635
Winifrede	54,106,399	473 933	44,354,534	1,695,007	....	....	....	100,629,873
Chilton	52,974,536	1,315,860	57,429,504	1,655,977	....	....	....	113,375,877
Cedar Grove............	96,013,209	4,795,085	98,048,333	4,415 939	....	....	....	203,272,566
Alma	77,111,654	4,906,598	110,621,491	4,064,671	....	....	....	196,704,414
Campbell Creek (including both the Peerless and No. 2 Gas divisions)...	328,786,698	20,919,951	395,114,988	22,403,082	....	....	....	767,224,719
Powellton (Brownstown)...	89 272,212	12,344,556	195,265,889	5,603,558	....	....	....	302,486,215
Eagle	192,461,322	23,016,407	281,817,170	14,117,622	....	....	....	511,412,521
Little Eagle............	98,538,993	11,485,901	129,712,619	7,527,168	....	....	....	247,264,681
Glenalum Tunnel............	....	25,112,863	12,829,639	....	....	....	....	37,942,502
Gilbert	15,946 445	10,554,762	....	8,006,676	....	....	....	34,507,883
Douglas	....	32,071,311	1,522,161	....	....	....	....	33,593,472
Sewell	102,257,971	427,258,783	....	80,540,698	177,908,797	8,625,577	170,599,081	967,190.907
Fire Creek (Quinnimont)...	....	89,885,537	....	....	....	95,700,972	257.261,875	442,848,284
No. 6 Pocahontas............	....	....	....	....	....	65,213,154	59 481,354	124,694,508
No. 3 Pocahontas............	....	....	....	....	....	71,391,007	6,523,545	77.914,552
Totals	1,267,368,789	664,838,507	1,421,001.077	154,591,304	177,908,797	240,930,710	493.865,855	4,420 505,039

The above summary is believed to represent approximately the amount of minable coal that was available before commercial operations were begun in the County more than 40 years ago. The table at the beginning of this Chapter, page 375, shows that the total coal that had been mined in Fayette previous to June 30, 1916, was 172,000,000 long tons. Reducing the latter figures to a short ton basis, there results 192,000,000 tons. For the two years that have elapsed since June 30, 1916, probably enough has been mined to bring the total up to 220,000,000 net tons. The amount of coal left in old ribs and pillars that will probably never be recovered, may increase this total to 265,000,000 net tons in round numbers, which sum should be deducted from the total in the above summary. The amount of coal available, after making this deduction, is, in round numbers, 4,155,000,000 net tons. Assuming an average recovery of 80 per cent., which appears conservative under modern and constantly improving mining methods, the probable amount of coal that will be eventually recovered in Fayette is in round numbers **3,325,000,000 short tons.**

MINABLE COAL BY MAGISTERIAL DISTRICTS.

All the minable coal beds have been described on preceding pages of this Chapter by magisterial districts. In the Index, under the heading **"Minable Coal by Magisterial Districts"**, will be found a series of page references classified by beds and districts, a feature that facilities investigation of the coal resources of any bed in any special region of the County by rendering all the information herein readily available.

TABLES OF COAL AND COKE ANALYSES.

On the immediately following pages four tables of analyses are published, these being designated Table 1, Table 2, Table 3, and Table 4, in the order in which they are given and all contain results from samples collected mostly in Fayette County, with a few from the adjoining portions of the immediately surrounding counties.

Table 1.—This table contains chemical analyses along with many calorific tests of **coal** from 152 different mines, the determinations of which were made mostly in the laboratories of the W. Va. Geological Survey and many of which had been published in previous State Survey Reports. The chemical and calorific work on the samples collected during 1916 and 1918, as described on preceding pages, was performed by J. Berghius Krak, Assistant Chemist, under the direction and with the assistance of B. H. Hite, Chief Chemist. All the samples, except those mentioned with the description of the opening, were collected by members of the Survey force, those from the commercial mines being taken according to methods prevailing with the U. S. Bureau of Mines, the coal being quartered down and sealed in tins at the mine, while those from the country banks and prospect openings were collected in small sacks with as much care as possible when depending on a scanty saddle-bag equipment. The numbers in the left-hand column correspond with those designating the mine or opening on Map II, as also that accompanying the description of the same in the text. The portion of the bed sampled is usually mentioned with the description of the mine or prospect. This table of analyses is immediately followed by another giving the accurate location of the corresponding mine or prospect and page references to the description of the latter in this Report.

Table 2.—This table contains chemical analyses from 28 samples of **coke** made from coal mined in Fayette County, practically all of which have been published in previous Reports of the State Survey. As with the table last described, the serial numbers in the left-hand column correspond with

those designating the mine on Map II and in the text from which the coal was taken to manufacture the coke. This table is immediately followed by another giving the accurate location of the mine and page references to its description in the text of this Report.

Table 3.—This table contains chemical analyses and calorific tests of coal from 70 different mines determined in the laboratories of the U. S. Geological Survey and the U. S. Bureau of Mines, compiled from publications of both the latter. As in Tables 1 and 2, described above, the numbers in the left-hand column are the same as used to designate the corresponding mine or opening on Map II and with its description in the text. This table is followed immediately by another giving the number of the mine; its accurate location; and page references to the description of the mine in this Report.

Table 4. This table contains the average analyses of coals purchased by the U. S. Government under specifications during the fiscal years 1908-1915. A more complete description immediately precedes this table.

Table 1—Coal Analyses by West Virginia Geological Survey.

No. on Map II.	Mine.	Coal Bed.	Condition of Sample.	PROXIMATE				Common to Both		ULTIMATE				Calorimeter B. T. U. for 1 Lb. of Coal	Calculated B. T. U. for 1 Lb. of Coal	Carbon divided by Oxygen + ash
				Moisture	Volatile Matter	Fixed Carbon	Phosphorus	Ash	Sulphur	Carbon	Hydrogen	Oxygen	Nitrogen			
3	W. R. Johnson (Crescent)	No. 5 Block	A. R.	1.11	34.63	59.07	6.01	5.19	0.74	.....	....	.....	....	......	......	....
4	Carver Bros	No. 5 Block	A. R.	0.84	37.78	57.08	0.004	4.30	0.84	.....	....	.....	....	......	......	....
5	Mecca Colliery Co	No. 5 Block	A. D.	1.90	31.50	60.28	0.007	6.32	0.59	76.64	4.89	10.44	1.12	13,774	13,391	4.57
5	Mecca Colliery Co	No. 5 Block	A. R.	2.84	31.20	59.70	0.007	6.26	0.59	75.91	5.00	11.13	1.11	13,642	13,304	4.36
6	Eureka Coal Co. (No. 14)	No. 5 Block	A. R.	1.07	34.46	59.31	0.004	5.16	0.77	.....	....	.....	....	......	......	....
6	Eureka Coal Co. (No. 14)	No. 5 Block	A. D.	1.30	34.22	61.43	0.003	3.05	0.76	80.93	4.81	9.22	1.23	14,397	14,068	6.59
6	Eureka Coal Co. (No. 14)	No. 5 Block	A. R.	1.49	34.16	61.31	0.003	3.04	0.76	80.78	4.83	9.36	1.23	14,369	11,049	6.51
9	Great Kanawha Colliery Co	No. 5 Block	A. R.	1.20	33.36	60.46	0.004	4.98	0.76	.....	....	.....	....	......	......	....
	Average	No. 5 Block	A. D.	1.60	32.86	60.86	0.005	4.68	0.68	78.78	4.85	9.83	1.18	14,086	13,730	5.43
	Average	No. 5 Block	A. R.	1.42	34.27	59.49	0.005	4.82	0.74	78.35	4.91	10.24	1.17	14,006	13,677	5.26
11	Bell Creek Coal Co	Coalburg	A. R.	0.65	33.73	55.87	0.008	9.75	0.70	.....	....	.....	....	......	......	....
12	Deitz Colliery Co	Coalburg	A. D.	1.98	33.67	59.50	0.004	4.85	0.67	79.09	5.33	9.00	1.06	14,809	14,135	5.71
12	Deitz Colliery Co	Coalburg	A. R.	2.47	33.51	59.19	0.004	4.83	0.67	78.70	5.39	9.35	1.06	14,735	14 090	5.55
14	Midvale Colliery Co. (Gamoca)	Coalburg	A. D.	1.43	33.37	60.42	0.010	4.78	0.71	79.64	5.44	8.46	0.97	14,561	14,328	6.01
14	Midvale Colliery Co. (Gamoca)	Coalburg	A. R.	1.96	33.20	60.08	0.010	4.76	0.71	79.22	5.50	8.84	0.97	14,484	14,280	5.82
	Average	Coalburg	A. D.	1.70	33.52	59.96	0.007	4.82	0.69	78.37	5.38	8.73	1.01	14,685	14,231	5.86
	Average	Coalburg	A. R.	1.69	33.48	58.38	0.007	6.45	0.69	78.96	5.45	9.09	1.01	14,609	14,185	5.68
17	Kanawha & Hocking C. & C. Co. (No. 111) (Gas)	No. 2 Gas	A. R.	0.69	35.90	61.13	0.014	2.28	0.66	.....	....	.....	....	......	......	....
17	Kanawha & Hocking C. & C. Co. (Splint)	No. 2 Gas	A. R.	0.53	35.87	57.45	0.006	6.15	0.54	.....	....	.....	....	......	......	....
19	Cannelton C. & C. Co. (No. 1) (Splint)	No. 2 Gas	A. R.	0.63	37.74	56.20	0.005	5.43	0.60	.....	....	.....	....	14,700	......	....
19	Cannelton C. & C. Co. (No. 1) (Gas)	No. 2 Gas	A. R.	0.72	36.65	60.95	0.0035	1.68	0.76	.....	....	.....	....	15,183	......	....
20	Cannelton C. & C. Co. (No. 2) (Gas)	No. 2 Gas	A. R.	0.47	35.77	60.22	0.0135	3.54	1.25	.....	....	.....	....	14,915	......	....
20	Cannelton C. & C. Co. (No. 2) (Splint)	No. 2 Gas	A. R.	0.47	35.41	58.47	0.004	5.65	1.06	.....	....	.....	....	14,637	......	....
23	Columbus Iron & Steel Co. (No. 1)	No. 2 Gas	A. R.	0.63	35.63	55.50	0.005	8.24	1.23	.....	....	.....	....	......	......	....
23	Columbus Iron & Steel Co. (No. 1)	No. 2 Gas	A. D.	1.16	32.64	59.53	0.012	6.67	0.84	79.12	4.82	7.37	1.18	14,438	14,022	5.63
23	Columbus Iron & Steel Co. (No. 1)	No. 2 Gas	A. R.	1.37	32.57	59.40	0.012	6.66	0.84	78.95	4.84	7.53	1.18	14,408	13 999	5.56
24	W. R. Johnson Coal Co	No. 2 Gas	A. R.	0.63	35 47	57.14	0.012	6.76	1.64	.....	....	.....	....	14,462	......	....
25	Kanawha & Hocking C. & C. Co. (Longacre) (Splint)	No. 2 Gas	A. R.	0.53	35.73	55.17	0.005	8.57	1.06	.....	....	.....	....	......	......	....
25	Kanawha & Hocking C. & C. Co. (Longacre) (Gas)	No. 2 Gas	A. R.	0.61	37.66	57.97	0.0085	3.76	1.28	.....	....	.....	....	......	......	....
25A	Kanawha & Hocking C. & C. Co. (Harewood) (Splint)	No. 2 Gas	A. R.	0.41	34.13	57.36	0.055	8.10	1.07	.....	....	.....	....	14,323	......	....
25A	Kanawha & Hocking C. & C. Co. (Harewood) (Gas)	No. 2 Gas	A. R.	0.59	33.63	62.59	0.054	3.19	0.95	.....	....	.....	....	14,985	......	....
27	Boomer C. & C. Co. (No. 1)	No. 2 Gas	A. R.	0.63	34.39	60.44	0.033	4.54	1.34	.....	....	.....	....	......	......	....
28A	Boomer C. & C. Co. (No. 3)	No. 2 Gas	A. D.	0.90	32.55	60.75	0.056	5.80	0.84	79.84	4.81	7.53	1.18	14,487	14,047	5.99
28A	Boomer C. & C. Co. (No. 3)	No. 2 Gas	A. R.	1.07	32.50	60.64	0.056	5.79	0.84	79.71	4.83	7.65	1.18	14,461	14,031	5.93
29	Sunday Creek Coal Co. (No. 117)	No. 2 Gas	A. R.	0.70	33.33	58.59	0.010	7.38	0.69	.....	....	.....	....	......	......	....

Table 1—Coal Analyses by West Virginia Geological Survey—(Continued).

[illegible]	Mine	Coal Bed	Condition of Sample	PROXIMATE				Common to Both		ULTIMATE				Calorimeter B. T. U. for 1 lb. of coal	Calculated B. T. U. for 1 lb. of coal	[illegible]
				Moisture	Volatile Matter	Fixed Carbon	Phosphorus	Ash	Sulphur	Carbon	Hydrogen	Oxygen	Nitrogen			
[illegible]	[illegible] Colliery Co.	No. 2 Gas	A. D.	0.75	33.50	60.35	0.009	5.40	0.91	79.09	5.44	7.92	1.21	14,231	14,351	[illegible]
[illegible]	[illegible] Colliery Co.	No. 2 Gas	A. R.	1.21	33.35	60.06	0.009	5.38	0.91	78.73	5.49	8.25	1.24	14,166	14,254	5.94
[illegible]	[illegible] Colliery Co.	No. 2 Gas	A. D.	1.00	32.35	62.62	0.001	4.03	0.72	79.91	5.44	8.75	1.15	14,725	14,350	[illegible]
[illegible]	[illegible] Colliery Co.	No. 2 Gas	A. R.	1.37	32.23	62.38	0.004	4.02	0.72	79.62	5.48	9.01	1.15	14,671	14,307	[illegible]
[illegible]	[illegible] Colliery Co.	No. 2 Gas	A. D.	1.05	33.45	59.41	0.004	6.09	0.80	78.55	5.11	8.38	1.07	[illegible]	13,975	5.43
[illegible]	[illegible] Colliery Co.	No. 2 Gas	A. R.	1.40	33.35	59.18	0.004	6.07	0.08	78.28	5.15	8.63	1.07	14,078	13,912	[illegible]
[illegible]	Gauley Mountain Coal Co. (Beck Run)	No. 2 Gas	A. R.	0.77	34.88	55.77	0.015	8.58	0.96	77.20	5.10	6.93	1.23	14,060	13,890	4.98
[illegible]	Gauley Mountain Coal Co.	No. 2 Gas	A. R.	0.65	36.76	57.13	0.009	5.46	0.91	80.20	5.33	6.81	1.29	14,490	14,484	6.54
[illegible]	Gauley Mountain Coal Co. (No. 2)	No. 2 Gas	A. R.	0.67	36.51	57.52	0.003	5.27	1.32	80.60	5.13	6.25	1.43	14,650	14,656	7.00
[illegible]	Kanawha Rail & River Coal Co. (Mecca)	No. 2 Gas	A. D.	0.90	32.20	60.96	0.007	5.94	0.59	79.61	4.89	7.50	1.47	14,398	14,097	5.95
[illegible]	Kanawha Rail & River Coal Co. (Mecca)	No. 2 Gas	A. R.	1.78	31.92	60.41	0.007	5.89	0.59	79.21	4.99	8.16	1.16	14,272	14,008	5.64
[illegible]	Eureka Coal Co. (No. 1)	No. 2 Gas	A. R.	0.51	31.93	57.07	0.012	10.49	0.71	.....	.....	.....	.....	.....	.....	.....
[illegible]	W. R. Johnson	No. 2 Gas	A. R.	0.74	34.66	58.57	0.032	6.03	1.30	.....	.....	.....	.....	14,551	.....	.....
43	Kanawha Rail & River Coal Co. (Edgewater No. 2)	No. 2 Gas	A. R.	0.48	31.37	61.91	0.005	6.24	1.47	.....	.....	.....	.....	14,606	.....	.....
44	St. Clair Colliery Co.	No. 2 Gas	A. R.	0.43	33.58	60.80	0.004	5.19	1.84	.....	.....	.....	.....	14,691	.....	.....
45	Kanawha Rail & River Colliery Co. (Diamond)	No. 2 Gas	A. R.	0.37	34.81	60.39	0.0055	4.43	1.77	.....	.....	.....	.....	14,669	.....	.....
45	Kanawha Rail & River Colliery Co. (Diamond)	No. 2 Gas	A. D.	1.22	33.38	62.55	0.008	2.85	1.34	80.00	5.33	9.21	1.27	14,875	14,280	6.63
45	Kanawha Rail & River Colliery Co. (Diamond)	No. 2 Gas	A. R.	1.33	33.34	62.48	0.008	2.85	1.34	79.91	5.31	9.29	1.27	14,809	14,271	6.58
46	Great Kanawha Col. Co. (No. 2)	No. 2 Gas	A. R.	0.71	34.04	61.79	0.047	3.46	0.98	.....	.....	.....	.....	.....	.....	.....
47	Great Kanawha Col. Co. (Digby)	No. 2 Gas	A. R.	0.62	35.34	58.18	0.008	5.86	2.48	.....	.....	.....	.....	14,674	.....	.....
48	Fort Defiance C. & C. Co.	No. 2 Gas	A. D.	1.55	32.60	62.94	0.007	2.91	0.82	80.15	5.56	9.06	1.20	15,052	14,182	6.72
48	Fort Defiance C. & C. Co.	No. 2 Gas	A. R.	2.12	32.41	62.58	0.007	2.89	0.82	79.99	5.62	9.48	1.20	14,975	14,471	6.57
49	M. B. Coal & Coke Co. (Kimberly) (U. B.)	No. 2 Gas	A. D.	1.20	32.18	60.07	0.021	6.55	1.45	77.50	4.40	9.06	1.04	13,884	13,359	4.96
49	M. B. Coal & Coke Co. (Kimberly) (U. B.)	No. 2 Gas	A. R.	1.35	32.13	59.98	0.021	6.54	1.45	77.38	4.42	9.17	1.04	13,861	13,341	4.93
49	M. B. Coal & Coke Co. (Kimberly) (L. B.)	No. 2 Gas	A. D.	0.95	32.65	62.36	0.011	4.04	1.11	80.50	4.90	8.17	1.28	14,650	14,160	6.75
49	M. B. Coal & Coke Co. (Kimberly) (L. B.)	No. 2 Gas	A. R.	1.23	32.57	62.17	0.011	4.03	1.11	80.28	4.93	8.37	1.28	14,609	14,126	6.47
50	M. B. Coal & Coke Co. (Columbia)	No. 2 Gas	A. D.	0.92	33.08	60.94	0.011	5.06	1.16	80.19	4.90	7.49	1.20	14,369	14,173	6.39
50	M. B. Coal & Coke Co. (Columbia)	No. 2 Gas	A. R.	1.13	33.01	60.81	0.011	5.05	1.16	80.03	4.92	7.64	1.20	14,339	14,148	6.31
51	Long Creek Col. Co. (Page) (U. B.)	No. 2 Gas	A. D.	0.94	29.96	64.21	0.010	4.89	1.32	80.19	5.33	7.18	1.09	14,599	14,464	6.64
51	Long Creek Col. Co. (Page) (U. B.)	No. 2 Gas	A. R.	1.31	29.85	63.96	0.010	4.88	1.32	79.90	5.37	7.44	1.09	14,545	14,428	6.49
51	Long Creek Col. Co. (Page) (L. B.)	No. 2 Gas	A. D.	1.00	35.00	61.02	0.002	2.98	0.66	82.36	5.56	7.48	0.96	15,093	14,871	7.87
51	Long Creek Col. Co. (Page) (L. B.)	No. 2 Gas	A. R.	1.38	34.87	60.78	0.002	2.97	0.66	82.09	5.60	7.72	0.96	15,036	14,843	7.67
51A	Long Creek Col. Co. (Beards Fork)	No. 2 Gas	A. R.	0.90	33.00	61.86	0.046	4.24	0.84	82.34	5.17	6.29	1.12	15,030	14,732	7.82
236	Christian Colliery Co. (No. 3)	No. 2 Gas	A. D.	0.60	33.45	58.89	0.004	7.06	2.23	78.86	5.01	5.65	1.19	14,220	14,230	6.21

Table 1—Coal Analyses by West Virginia Geological Survey—(Continued).

No. on Map II.	Mine.	Coal Bed.	Condition of Sample.	PROXIMATE				Common to Both		ULTIMATE				Calorimeter B. T. U. for 1 Lb. of Coal	Calculated B. T. U. for 1 Lb. of Coal	Carbon divided by Oxygen — ash.
				Moisture	Volatile Matter	Fixed Carbon	Phosphorus	Ash	Sulphur	Carbon	Hydrogen	Oxygen	Nitrogen			
336	Christian Colliery Co. (No. 3)	No. 2 Gas	A. R.	2.58	32.79	57.71	0.004	6.92	2.19	77.28	5.13	7.31	1.17	13,940	13,950	5.43
336A	Paint Creek Coal Mining Co	No. 2 Gas	A. D.	0.52	35.93	57.98	0.005	5.57	2.31	79.21	5.46	6.42	1.03	14,640	14,500	6.61
336A	Paint Creek Coal Mining Co	No. 2 Gas	A. R.	2.02	35.39	57.10	0.005	5.49	2.27	78.02	5.55	7.66	1.01	14,420	14,280	5.93
52	Gauley Mountain Coal Co	No. 2 Gas	A, R.	0.89	32.29	65.41	0.003	1.41	0.91	.....	....	.....	....	14,951	......	.....
54	Craft & Evans (Pine Top)	No. 2 Gas	A. D.	1.20	34.50	60.37	0.007	3.93	0.82	79.91	5.56	8.69	1.09	14,832	14,428	6.38
54	Craft & Evans (Pine Top)	No. 2 Gas	A. R.	1.94	34.24	59.92	0.007	3.90	0.82	79.32	5.64	9.21	1.08	14,721	14,355	6.01
55	Long Branch Coal Co	No. 2 Gas	A. D.	0.86	29.65	64.64	0.023	4.85	0.80	81.63	5.31	6.26	1.15	14,710	14,740	7.35
55	Long Branch Coal Co	No. 2 Gas	A. R.	2.82	29.06	63.37	0.023	4.75	0.78	80.01	5.42	7.91	1.13	14,420	14,450	6.32
56	Willis Branch Coal Co	No. 2 Gas	A. D.	0.37	29.17	64.60	0.004	5.86	0.77	81.65	5.28	5.20	1.24	14,730	14 780	7.38
56	Willis Branch Coal Co	No. 2 Gas	A. R.	2.12	28.66	63.46	0.004	5.76	0.76	80.21	5.38	6.67	1.22	14,470	14,520	6.45
	Average	No. 2 Gas	A. D.	0.95	32.68	61.34	0.0114	5.03	1.08	79.94	5.17	7.63	1.15	14,559	14,291	6.39
	Average	No. 2 Gas	A. R.	1.03	33.88	59.82	0.0135	5.27	1.11	79.51	5.23	7.88	1.15	14,572	14,247	6.17
58	Mt. Carbon Co., Ltd. (Vulcan)	Powellton	A. R.	0.71	31.38	64.37	0.004	3.54	0.75	.....	....	.....	....	14,997	......	.....
60	M. B. Coal Co. (Elk Ridge No. 1)	Powellton	A. D.	1.00	30.85	62.78	0.008	5.37	0.69	78.00	5.44	9.40	1.10	14,431	14,015	5.28
60	M. B. Coal Co. (Elk Ridge No. 1)	Powellton	A. R.	1.22	30.78	62.64	0.008	5.36	0.69	77.83	5.46	9.56	1.10	14,100	13,996	5.22
60	M. B. Coal Co. (Elk Ridge No. 1) (Bot. B.)	Powellton	A. D.	1.10	31.60	63.84	0.004	3.46	1.13	81.82	5.11	7.33	1.15	14 959	14,545	7.58
60	M. B. Coal Co. (Elk Ridge No. 1) (Bot. B.)	Powellton	A. R.	1.35	31.52	63.67	0.004	3.46	1.13	81.62	5.14	7.50	1.15	13,922	14,522	7.15
61	M. B. Coal Co. (Elk Ridge No. 2)	Powellton	A. D.	0.82	31.18	64.79	0.004	3.21	0.64	82.36	5.00	7.68	1.11	14,931	14,510	7.56
61	M. B. Coal Co. (Elk Ridge No. 2)	Powellton	A. R.	1.02	31.12	64.66	0.004	3.20	0.64	82.19	5.02	7.84	1.11	14,901	14,486	7.45
61A	Eagle By-Products Coal Co	Powellton	A. R.	0.78	35.32	54.96	0.006	8.94	0.80	78.08	4.84	6.27	1.07	14,010	13,910	5.13
62A	Christian Colliery Co. (No. 2)	Powellton	A. D.	1.01	34.27	61.22	0.006	3.50	0.62	80.75	5.57	8.37	1.19	14,500	14,570	6.80
62A	Christian Colliery Co. (No. 2)	Powellton	A. R.	1.01	34.27	61.22	0.006	3.50	0.62	80.75	5.57	8.37	1.19	14,500	14,570	6.80
63	Milburn Coal Co. (No. 2)	Powellton	A. D.	0.63	31.59	63.73	0.010	4.05	0.55	82.54	5.11	6.59	1.16	14,940	14,690	7.76
63	Milburn Coal Co. (No. 2)	Powellton	A. R.	2.76	30.92	62.36	0.010	3.96	0.54	80.77	5.24	8.35	1.14	14,620	14,380	6.56
64	Solvay Collieries Co. (Westerly, No. 2)	Powellton	A. R.	0.48	31.52	63.15	0.003	4.85	0.91	81.51	5.12	6.38	1.23	14,790	14 580	7.13
64	Solvay Collieries Co. (Westerly, No. 2)	Powellton	A. R.	0.48	31.52	63.15	0.003	4.85	0.91	81.51	5.12	6.38	1.23	14,790	14,580	7.43
65	Solvay Collieries Co. (Westerly, No. 6)	Powellton	A. D.	2.90	29.70	57.95	0.003	9.15	0.60	71.20	4.61	13.07	1.07	12,570	12,230	3.16
65	Solvay Collieries Co. (Westerly, No. 6)	Powellton	A. R.	7.76	28.21	55.05	0.003	8.98	0.57	67.64	4.93	16.86	1.02	11,940	11,620	2.62
67	Solvay Collieries Co. (Westerly, No. 8)	Powellton	A. D.	0.52	29.78	62.22	0.006	7.48	1.40	79.14	4.92	5.97	1.09	14,320	14,160	5.88
67	Solvay Collieries Co. (Westerly, No. 8)	Powellton	A. R.	1.66	29.44	61.51	0.006	7.39	1.39	78.23	4.98	6.93	1.08	14,160	14,000	5.45
	Average	Powellton	A. D.	1.06	31.31	62.46	0.0055	5.17	0.82	79.66	5.11	8.10	1.14	14.430	14,163	6.43
	Average	Powellton	A. R.	1.87	31.45	61.36	0.0054	5.32	0.80	78.74	5.16	8.67	1.12	14,224	14,007	6.01
73	Boomer C. & C. Co. (No. 2 N.)	Eagle	A. R.	0.79	32.90	61.05	0.009	5.26	0.76	.....	....	.....	....	14,933	......	.....
368	Greenbrier Coal Co. (Greenbrier)	Eagle	A. D.	0.96	37.78	57.36	0.004	3.90	0.52	81.20	5.91	6.98	1.49	14,850	14,960	7.46

Table 1--Coal Analyses by West Virginia Geological Survey—(Continued).

[illegible]	Mine	Coal Bed	Condition of Sample		PROXIMATE				Common to Both		ULTIMATE				[illegible]	[illegible]	[illegible]
					Moisture	Volatile Matter	Fixed Carbon	Phosphorus	Ash	Sulphur	Carbon	Hydrogen	Oxygen	Nitrogen			
[illegible]	[illegible] Coal Co. ([illegible])	Eagle	A.	R.	2.35	37.25	56.55	0.004	3.85	0.52	80.06	5.98	8.13	1.46	14,650	14,7[illegible]0	6.68
[illegible]	Eagle Coal Co. ([illegible])	Eagle	A.	R.	0.86	32.27	56.82	0.017	10.05	0.85	.....	.....	.....	.....	14,172	.....	.....
[illegible]	W. W. Johnson (No. 1)	Eagle	A.	R.	0.97	33.36	60.90	0.009	4.77	0.85	.....	.....	.....	.....	14,671	.....	.....
[illegible]	Kanawha Rail & River Coal Co. ([illegible] No. 1)	Eagle	A.	R.	0.71	32.00	60.12	0.009	7.17	1.00	.....	.....	.....	.....	14,422	.....	.....
[illegible]	St. Clair Coal Mining Co.	Eagle	A.	R.	0.81	31.66	61.36	0.017	6.17	1.06	.....	.....	.....	.....	14,422	.....	.....
[illegible]	Paint Creek Coal Co. (No. 8)	Eagle	A.	D.	1.35	27.65	67.48	0.030	3.52	0.93	81.82	5.22	7.45	1.06	14,822	14,599	7.46
[illegible]	Paint Creek Coal Co. (No. 8)	Eagle	A.	R.	1.71	27.55	67.23	0.030	3.51	0.93	81.53	5.26	7.71	1.06	14,779	14,562	7.75
[illegible]	Paint Creek Coal Co. (No. 8) (Bone)	Eagle	A.	D.	0.40	26.40	61.99	0.008	11.21	0.48	77.18	4.89	5.25	0.99	13,851	13,868	4.79
[illegible]	Paint Creek Coal Co. (Hickory Camp)	Eagle	A.	D.	1.00	28.35	66.05	0.010	4.60	0.72	79.09	5.56	8.81	1.19	14,173	14,298	5.88
[illegible]	Paint Creek Coal Co. (Hickory Camp)	Eagle	A.	R.	2.06	28.05	65.34	0.010	4.55	0.72	78.25	5.68	9.62	1.18	14,615	14,188	5.52
[illegible]	Paint Creek Coal Co. (Hickory Camp) (Bot. B.)	Eagle	A.	D.	0.50	28.50	66.83	0.010	4.17	0.60	79.36	5.56	9.10	1.21	14,761	14,508	5.98
[illegible]	Paint Creek Coal Co. (Hickory Camp) (Bot. B.)	Eagle	A.	R.	3.20	27.73	64.99	0.010	4.08	0.58	77.51	5.86	10.79	1.18	14,361	14,091	5.21
[illegible]	Christian Colliery Co. (No. 1)	Eagle	A.	D.	0.63	33.34	60.62	0.003	5.41	0.67	81.20	5.31	6.23	1.18	14,730	14,650	6.98
[illegible]	Christian Colliery Co. (No. 1)	Eagle	A.	R.	1.50	33.05	60.10	0.003	5.35	0.67	80.50	5.35	6.96	1.17	14,610	14,530	6.54
83A	Eagle By-Products Coal Co.	Eagle	A.	R.	1.14	31.73	62.31	0.008	4.82	1.03	82.24	5.16	5.65	1.10	14,740	14,770	7.78
[illegible]	Milburn Coal Co.	Eagle	A.	D.	1.36	29.25	63.19	0.008	6.20	0.49	79.60	5.05	7.47	1.19	14,290	14,150	5.96
[illegible]	Milburn Coal Co.	Eagle	A.	R	2.92	28.79	62.19	0.008	6.10	0.48	78.34	5.14	8.77	1.17	14,070	13,930	5.27
[illegible]	[illegible] Collieries Co. (Westerly, No. 1)	Eagle	A.	D.	0.38	31.76	64.05	0.005	3.81	0.63	83.55	5.56	5.20	1.25	15,050	15,220	9.27
[illegible]	[illegible] Collieries Co. (Westerly, No. 1)	Eagle	A.	R.	1.97	31.26	63.02	0.005	3.75	0.63	82.22	5.65	6.52	1.23	14,810	14,980	6.36
[illegible]	[illegible] Collieries Co. (Westerly, No. 5)	Eagle	A.	D.	0.51	30.35	63.83	0.005	5.31	0.69	80.50	5.19	7.11	1.20	14,770	14,650	6.48
[illegible]	[illegible] Collieries Co. (Westerly, No. 5)	Eagle	A.	R.	4.32	29.19	61.38	0.005	5.11	0.66	77.42	5.42	10.24	1.15	14,210	14,090	5.04
[illegible]	[illegible] Collieries Co. (Westerly, No. 2)	Eagle	A.	D.	0.34	30.99	63.69	0.009	4.98	1.02	82.16	5.23	5.31	1.30	14,850	14,830	7.98
[illegible]	[illegible] Collieries Co. (Westerly, No. 2)	Eagle	A.	R.	1.19	30.73	63.15	0.009	4.93	1.01	81.46	5.28	6.04	1.28	14,730	14,710	7.43
[illegible]	Willis Branch Coal Co. (Herberton)	Eagle	A.	D.	0.95	28.40	66.99	0.003	3.66	0.71	85.57	4.28	4.44	1.31	15,213	14,791	10.56
[illegible]	Willis Branch Coal Co. (Herberton)	Eagle	A.	R.	1.50	28.25	66.61	0.003	3.64	0.74	85.10	4.34	4.88	1.30	15,129	14,720	9.99
	Average	Eagle	A.	D.	0.76	30.25	63.83	0.008	5.16	0.68	81.02	5.25	6.67	1.22	14,722	14,575	7.17
	Average	Eagle	A.	R.	1.75	30.99	62.07	0.009	5.19	0.78	80.42	5.37	7.75	1.21	14,583	14,481	6.64
91	K. & M. R. R. Cut	Little Eagle	A.	R.	0.60	39.13	58.50	0.003	1.77	0.60	83.00	5.31	7.81	1.51	15,030	14,780	8.66
92	Kincaid & [illegible]	Little Eagle	A.	R.	0.86	34.85	62.28	0.005	2.01	0.70	83.90	5.21	6.77	1.41	14,910	14,910	9.56
93	[illegible] Colliery Co. (Beech Creek)	Little Eagle	A.	D.	0.25	29.45	60.85	0.012	9.45	0.57	77.62	4.28	6.91	1.17	13,700	13,434	4.74
93	[illegible] Colliery Co. (Beech Creek)	Little Eagle	A.	R.	0.71	29.32	60.57	0.012	9.40	0.57	77.26	4.33	7.27	1.17	13,637	13,379	4.63
	Average	Little Eagle	A.	R.	0.73	34.43	60.45	0.007	4.39	0.62	81.39	4.95	7.98	1.37	14,526	14,366	7.62
94	[illegible]	Glenalum Tunnel	A.	R.	0.37	28.85	68.63	0.003	2.15	0.58	86.32	5.29	4.46	1.20	15,210	15,519	13.06
[illegible]	McKinley [illegible]	Glenalum Tunnel	A.	R.	[illegible]	29.21	65.37	0.010	[illegible]	0.58	84.35	5.31	3.34	1.32	14,720	14,790	10.03

Table 1—Coal Analyses by West Virginia Geological Survey—(Continued).

No. on Map II.	Mine.	Coal Bed.	Condition of Sample.	PROXIMATE				Common to Both		ULTIMATE				Calorimeter B. T. U. for 1 Lb. of Coal	Calculated B. T. U. for 1 Lb. of Coal	Carbon divided by Oxygen + ash.
				Moisture	Volatile Matter	Fixed Carbon	Phosphorus	Ash	Sulphur	Carbon	Hydrogen	Oxygen	Nitrogen			
	Average	Glenalum Tunnel	A. R.	0.36	29.03	67.00	0.006	3.61	0.58	85.34	5.31	3.90	1.26	14,980	15,115	11.54
96	J. F. Neff	Gilbert	A. R.	0.57	33.73	59.10	0.007	6.60	1.04	77.88	5.37	7.65	1.46	14,250	14,120	5.47
97	Geo. Hawver	Gilbert	A. R.	0.70	35.56	60.62	0.008	3.12	0.82	82.27	5.50	6.84	1.45	14,740	14,880	8.26
	Average	Gilbert	A. R.	0.63	34.65	59.86	0.007	4.86	0.93	80.08	5.43	7.24	1.46	14,495	14,500	6.86
98	Lewis Kidd	Douglas (Kidd)	A. D.	0.80	20.85	70.49	0.103	7.86	0.97	82.46	4.23	3.18	1.30	14,777	14 407	7.47
98	Lewis Kidd	Douglas (Kidd)	A. R.	1.42	20.72	70.05	0.103	7.81	0.97	81.95	4.30	3.68	1.29	14,686	14,353	7.13
99	....	Hughes Ferry	A. R.	0.61	32.10	63.27	0.009	4.02	1.47	83.56	4.72	5.06	1.17	14,600	14,750	9.20
100	Matthews & Morton	Sewell	A. R.	0.89	31.84	64.62	0.005	2.65	0.52	84.25	4.85	6.56	1.17	14,850	14,770	9.15
454	Flinn Lumber Co	Sewell	A. D.	0.79	31.11	64.65	0.004	3.45	0.48	83.40	5.52	5.94	1.21	14,970	15,110	8.88
454	Flinn Lumber Co	Sewell	A. R.	1.04	31.04	64.48	0.004	3.44	0.48	83.19	5.54	6.14	1.21	14,930	15,070	8.68
458	K. & M. R. R	Sewell	A. R.	3.94	27.16	62.98	0.007	5.92	0.55	....	....	....	....	....	....	....
101	....	Sewell	A. R.	0.43	31.85	55.55	0.024	12.17	3.78	73.83	4.59	4.63	1.00	13,390	13,380	4.39
103	Gaymont Colliery Co	Sewell	A. R.	0.82	26.63	70.87	0.023	1.68	0.54	....	....	....	....	15 258	....	....
105	Elmo Mining Co. (Elmo)	Sewell	A. R.	0.75	26.54	70.37	0.053	2.34	0.55	....	....	....	....	15,348	....	....
106	Boone C. & C. Co. (Michigan)	Sewell	A. R.	0.63	25.74	71.21	0.005	2.42	0.62	....	....	....	....	15,274	....	....
107	Ajax Coal Co. (Ajax)	Sewell	A. R.	0.61	25.51	69.46	0.005	4.42	0.75	....	....	....	....	15,156	....	....
109	Nuttallburg Smokeless Fuel Co. (Nuttallburg)	Sewell	A. R.	0.49	25.99	71.49	0.005	2.03	0.57	....	....	....	....	15,571	....	....
110	Aileen Coal Co. (Keeneys Creek)	Sewell	A. R.	1.01	25.53	71.37	0.006	2.09	0.72	....	....	....	....	15,600	....	....
115	Keeneys Creek Col. Co. (Lower Boone)	Sewell	A. R.	0.70	26.17	70.49	0.017	2.64	0.68	....	....	....	....	15,443	....	....
115A	Rothwell Coal Co. (Quarrier)	Sewell	A. R.	0.75	24.39	70.88	0.005	3.98	0.73	....	....	....	....	15,048	....	....
117	Blume C. & C. Co. (Blume)	Sewell	A. R.	0.87	26.91	69.78	0.004	2.44	0.85	....	....	....	....	15,203	....	....
119	Rothwell Coal Co. (Dubree)	Sewell	A. R.	0.74	28.58	66.36	0.018	4.32	0.98	....	....	....	....	14.893	....	....
120	Keeneys Creek Col. Co. (Smokeless)	Sewell	A. R.	0.74	27.09	70.58	0.005	1.59	0.53	....	....	....	....	15,359	....	....
122	Ballinger Coal Co. (No. 1)	Sewell	A. R.	0.50	24.61	67.49	0.015	7.40	0.79	....	....	....	....	14,281	....	....
125	James Walker (Nuttall Estate)	Sewell	A. R.	0.66	27.79	68.56	0.003	2.99	0.84	86.03	4.82	3.91	1.41	14,960	15,230	12.47
126	Wilderness Lumber Co	Sewell	A. R.	0.61	28.34	67.64	0.005	3.41	0.63	84.50	4.77	5.31	1.38	14,850	15,090	9.69
127	New River Valley Coal Co	Sewell	A. D.	1.00	25.30	69.17	0.01	4.53	0.63	81.27	5.00	7.39	1.18	14,599	14,376	6.82
127	New River Valley Coal Co	Sewell	A. R.	1.30	25.23	68.95	0.01	4.52	0.63	81.03	5.03	7.61	1.18	14,555	14,341	6.53
128	Marrs Branch Coal Co. (Cataract)	Sewell	A. D.	0.65	25.15	69.51	0.01	4.69	0.79	81.00	4.89	7.47	1.16	14,571	14,269	6.66
128	Marrs Branch Coal Co. (Cataract)	Sewell	A. R.	1.10	25.04	69.19	0.01	4.67	0.79	80.64	4.94	7.80	1.16	14,505	15,217	6.48
129	Low Moor Iron Co. (Low Moor No. 2)	Sewell	A. D.	0.97	23.23	70.30	0.007	5.50	0.66	81.00	5.33	6.20	1.31	14,627	14,631	6.92
129	Low Moor Iron Co. (Low Moor No. 2)	Sewell	A. R.	1.36	23.14	70.02	0.007	5.48	0.66	80.69	5.37	6.49	1.31	14,570	14,591	6.74
130	Low Moor Iron Co. (Kaymoor No. 1)	Sewell	A. R.	0.96	25.14	71.15	0.005	2.75	0.56	....	....	....	....	14,965	....	....
131	Brown Coal Co. (South Nuttall)	Sewell	A. R.	0.56	25.52	70.80	0.006	3.12	0.63	....	....	....	....	15,109	....	....
132	Branch Coal Co. (Chapman)	Sewell	A. R.	0.67	25.31	70.95	0.005	3.07	0.65	....	....	....	....	15,130	....	....

Table 1—Coal Analyses by West Virginia Geological Survey—(Continued).

[illegible]	Mine	Coal Bed.	Condition of Sample.	PROXIMATE				Common to Both.		ULTIMATE				[illegible] B. T. U.	[illegible] B. T. U.	[illegible]
				Moisture	Volatile Matter	Fixed Carbon	Phosphorus	Ash	Sulphur	Carbon	Hydrogen	Oxygen	Nitrogen			
[illegible]	[illegible] C. (Greenside?)	Sewell	A. R.	0.73	23.98	73.11	0.003	2.18	0.54	.....	.....	.....	.....	15,563	.....	.....
[illegible]	[illegible] Coal Co. ([illegible])	Sewell	A. R.	0.71	24.12	73.21	0.004	1.96	0.51	.....	.....	.....	.....	15,601	.....	.....
[illegible]	[illegible] Coal Co. (Brooklyn)	Sewell	A. R.	1.04	24.85	72.63	0.005	1.48	0.62	.....	.....	.....	.....	15,620	.....	.....
[illegible]	[illegible] Coal Co. (Concho)	Sewell	A. R.	0.71	24.23	73.34	0.006	1.72	0.55	.....	.....	.....	.....	15,576	.....	.....
[illegible]	New River & Poca. Cons. Coal Co. (Minden No. 2)	Sewell	A. R.	0.89	22.54	74.58	0.005	1.99	0.61	.....	.....	.....	.....	15,51[illegible]	.....	.....
[illegible]	New River Co. (Lochgelly) (Stuart)	Sewell	A. D.	0.70	21.40	74.47	0.006	3.43	0.42	86.06	4.12	4.76	1.21	15,060	14,720	10.51
[illegible]	New River Co. (Lochgelly) (Stuart)	Sewell	A. R.	0.94	21.35	74.29	0.006	3.42	0.42	85.85	4.15	4.95	1.21	15,021	[illegible]	10.26
144	[illegible] Coal Co. (Summerlee) (Pattal)	Sewell	A. D.	0.45	22.95	73.59	0.004	3.01	0.51	85.54	4.61	5.03	1.30	15,29[illegible]	14,929	10.64
144	[illegible] Coal Co. (Summerlee) (Pattal)	Sewell	A. R.	0.52	22.93	73.54	0.004	3.01	0.51	85.48	4.62	5.08	1.30	15,279	[illegible]	10.56
146	[illegible] Coal Co. (Sewell Knob)	Sewell	A. D.	1.00	20.65	72.45	0.002	5.90	3.07	82.00	4.53	3.39	1.11	14,464	14,598	8.83
146	[illegible] Coal Co. (Sewell Knob)	Sewell	A. R.	1.16	20.62	72.33	0.002	5.89	3.07	81.87	4.55	3.51	1.11	14,441	14,582	8.71
147	Meadow Fork Coal Co. (Meadow Fork)	Sewell	A. D.	0.85	21.63	74.22	0.002	3.30	0.82	86.60	4.44	3.51	1.33	15,290	15,168	12.72
147	Meadow Fork Coal Co. (Meadow Fork)	Sewell	A. R.	1.18	21.56	73.97	0.002	3.29	0.82	86.31	4.48	3.77	1.33	15,240	15,073	12.[illegible]
151	[illegible] Coal Co. ([illegible])	Sewell	A. R.	0.67	21.37	74.33	0.011	3.63	0.71	.....	.....	.....	.....	15,095	.....	.....
152	Harvey C. & C. Co. (Harvey)	Sewell	A. R.	0.67	22.91	74.10	0.006	2.32	0.61	.....	.....	.....	.....	15,463	.....	.....
153	Star C. & C. Co. (Star)	Sewell	A. R.	0.76	21.18	74.92	0.006	3.14	0.69	.....	.....	.....	.....	15,321	.....	.....
155	New River Co. (Collins)	Sewell	A. R.	0.76	21.55	71.63	0.003	6.06	0.87	.....	.....	.....	.....	14,891	.....	.....
155A	Nuttall Colliery Co.	Sewell	A. D.	0.55	16.40	77.52	0.007	5.53	0.82	84.79	4.51	3.26	1.09	15,140	14,910	9.65
155A	Nuttall Colliery Co.	Sewell	A. R.	0.72	16.37	77.39	0.007	5.52	0.82	84.65	4.53	3.39	1.09	15,114	14,895	9.60
156	White Oak Fuel Co. (Wingrove)	Sewell	A. D.	0.50	18.10	77.56	0.007	3.84	0.57	85.93	4.47	3.93	1.26	14,90[illegible]	14,987	11.06
156	White Oak Fuel Co. (Wingrove)	Sewell	A. R.	0.85	18.04	77.29	0.007	3.82	0.57	85.63	4.51	4.21	1.26	14,848	14,949	10.66
159	White Oak Fuel Co. (Oakwood)	Sewell	A. D.	0.60	19.47	75.26	0.006	4.67	1.16	85.65	4.50	2.74	1.28	14,905	15,080	11.56
159	White Oak Fuel Co. (Oakwood)	Sewell	A. R.	0.77	19.44	75.13	0.006	4.66	1.16	85.51	4.52	2.87	1.28	14,880	15,066	11.36
161	New River Coal Co. (Sun No. 1)	Sewell	A. R.	0.73	20.67	76.46	0.003	2.14	0.59	.....	.....	.....	.....	15,446	.....	.....
163	McKell C. & C. Co. (Derryhale)	Sewell	A. R.	0.61	21.31	69.78	0.008	8.30	2.54	.....	.....	.....	.....	14,389	.....	.....
164	New River C. & C. Co. (No. 1)	Sewell	A. R.	0.54	21.50	74.51	0.005	3.45	0.91	.....	.....	.....	.....	15,419	.....	.....
167	Turkey Knob C. & C. Co. (Turkey Knob)	Sewell	A. R.	0.77	21.29	74.58	0.006	3.36	0.77	.....	.....	.....	.....	15,225	.....	.....
168	New River C. & C. Co. (Macdonald)	Sewell	A. R.	0.46	21.46	75.12	0.005	2.96	0.69	.....	.....	.....	.....	15,219	.....	.....
169	Sugar Creek C. & C. Co. (Sugar Creek)	Sewell	A. R.	0.53	19.41	74.08	0.005	5.98	0.97	.....	.....	.....	.....	14,992	.....	.....
172	McKell C. & C. Co. (Kilsyth)	Sewell	A. R.	0.48	22.09	74.28	0.002	3.15	0.68	.....	.....	.....	.....	15,426	.....	.....
173	White Oak Fuel Co. (Sherwood)	Sewell	A. D.	0.45	18.99	77.94	0.007	2.62	0.70	87.21	4.08	4.11	1.28	15,190	14,926	12.96
173	White Oak Fuel Co. (Sherwood)	Sewell	A. R.	0.50	18.98	77.90	0.007	2.62	0.70	87.17	4.09	4.14	1.28	15,182	14,918	12.90
174	New River & Poca. Cons. Coal Co. (Weirwood)	Sewell	A. D.	0.36	20.85	76.29	0.003	2.50	0.65	86.74	5.12	3.61	1.38	15,470	15,540	14.20
174	New River & Poca. Cons. Coal Co. (Weirwood)	Sewell	A. R.	4.37	20.01	73.22	0.003	2.40	0.64	83.26	5.36	7.01	1.33	14,850	14,920	8.85
181	Babcock C. & C. Co. (Clifftop)	Sewell	A. R.	0.67	23.40	71.04	0.010	4.89	0.68	.....	.....	.....	.....	15,021	.....	.....

Table 1—Coal Analyses by West Virginia Geological Survey—(Concluded).

No. on Map II.	Mine.	Coal Bed.	Condition of Sample.	PROXIMATE				Common to Both		ULTIMATE				Calorimeter B. T. U. for 1 Lb. of Coal	Calculated B. T. U. for 1 Lb. of Coal	Carbon divided by Oxygen + ash.
				Moisture	Volatile Matter	Fixed Carbon	Phosphorus	Ash	Sulphur	Carbon	Hydrogen	Oxygen	Nitrogen			
184	A. W. Ashley	Sewell	A. R.	0.62	25.88	71.16	0.008	2.34	0.59	85.49	4.71	5.69	1.18	15 010	14,940	10.65
185	Meadow River Lumber Co	Sewell	A. R.	0.56	26.84	69.31	0.008	3.29	0.58	84.78	4.84	5.46	1.05	14,840	14,930	9.69
186	Ben Sycafoose	Sewell	A. R.	0.50	23.69	71.20	0.009	4.61	0.84	83.57	4.52	4.94	1.52	14,800	14,610	8.75
	Average	Sewell	A. D.	0.68	21.94	73.30	0.004	4.08	0.87	84.39	4.70	4.72	1.24	14,960	14,900	10.11
	Average	Sewell	A. R.	0.88	24.05	71.39	0.008	3.68	0.82	83.68	4.74	5.17	1.24	15,066	14,759	9.41
189	Rock Lick Coal Co. (Erskine)	Fire Creek	A. R.	0.57	21.35	74.31	0.007	3.77	0.91	.....	....	.....	....	15,327	....	.....
191	N. R. & Poca. Cons. Coal Co	Fire Creek	A. R.	0.61	19.72	75.37	0.006	4.30	0.60	.....	....	.....	....	15,208	....	.....
192	Newlyn Coal Co	Fire Creek	A. D.	1.15	19.60	75.27	0.006	3.98	0.61	85.56	4.05	4.54	1.26	14,970	14,627	10.04
192	Newlyn Coal Co	Fire Creek	A. R.	1.33	19.57	75.12	0.006	3.98	0.61	85.41	4.07	4.67	1.26	14,943	14,614	9.87
193	Dunglen Coal Co. (McKell Estate) (Fire Creek)	Fire Creek	A. D.	0.65	18.00	78.63	0.019	2.72	0.63	86.67	4.54	4.11	1.33	15,470	15,119	12.69
193	Dunglen Coal Co. (McKell Estate) (Fire Creek)	Fire Creek	A. R.	0.78	17.98	78.52	0.019	2.72	0.63	86.56	4.55	4.21	1.33	15.451	15 106	12.49
538		Fire Creek	A. R.	3.32	23.01	70.35	0.004	3.32	0.63	.....	....	.....	....	......	....	.....
194	Fire Creek C. & C. Co. (Fire Creek)	Fire Creek	A. R.	0.82	20.55	74.11	0.024	4.52	0.55	.....	....	.....	....	15,098	....	.....
196	Beury Bros. C. & C. Co. (Echo)	Fire Creek	A. R.	0.57	20.95	72.36	0.130	6.12	0.95	.....	....	.....	....	14,758	....	.....
197	Big Bend Coal Co. (Dimmock)	Fire Creek	A. R.	0.70	21.64	76.46	0.002	1.20	0.64	.....	....	.....	....	15,504	....	.....
198	Stone Cliff C. & C. Co	Fire Creek	A. R.	0.44	20.73	77.20	0.003	1.63	0.77	.....	....	.....	....	15,476	....	.....
200	Beechwood C. & C. Co. (No. 1)	Fire Creek	A. R.	0.82	20.08	74.65	0.056	4.45	0.63	.....	....	.....	....	15,125	....	.....
201	Alaska C. & C. Co. (Alaska)	Fire Creek	A. R.	0.38	20.71	72.21	0.020	6.70	0.48	.....	....	.....	....	14,964	....	.....
203	Ephraims Creek C. & C. Co	Fire Creek	A. R.	0.44	21.43	74.21	0.033	3.92	0.55	.....	....	.....	....	15,147	....	.....
204	Phoenix Coal Co. (Slater)	Fire Creek	A. R.	0.59	17.88	78.57	0.010	2.96	0.52	.....	....	.....	....	15,334	....	.....
207	Royal C. & C. Co. (Royal)	Fire Creek	A. R.	0.62	18.57	78.36	0.014	2.45	0.62	.....	....	.....	....	15,438	....	.....
209	Export Coal Co	Fire Creek	A. R.	0.75	19.16	75.63	0.008	4.46	0.63	.....	....	.....	....	15,101	....	.....
210	Laurel Creek Coal Co. (Laurel Creek)	Fire Creek	A. R.	0.62	18.03	76.59	0.019	4.76	0.71	.....	....	.....	....	15,080	....	.....
213	Quinnimont C. & C. Co. (Big "Q")	Fire Creek	A. R.	0.83	19.26	70.95	0.152	8.96	0.96	.....	....	.....	....	14,833	....	.....
214	Greenwood Coal Co	Fire Creek	A. R.	0.69	19.29	75.42	0.046	4.60	0.77	.....	....	.....	....	15,455	....	.....
	Average	Fire Creek	A. D.	0.90	18.80	76.95	0.014	3.35	0.62	86.12	4.30	4.32	1.29	15,220	14 873	11.36
	Average	Fire Creek	A. R.	0.83	19.99	75.02	0.031	4.16	0.68	85.99	4.31	4.44	1.29	15,191	14 860	11.18
221	Wm. Sims	Little Fire Creek	A. R.	0.38	23.51	74.49	0.002	1.62	0.66	87.06	5.46	3.89	1.31	15,470	15,720	15.80
222	Meadow River Smokeless Coal Co	No. 6 Pocahontas	A. R.	0.32	21.60	74.61	0.012	3.47	0.54	86.24	4.64	4.02	1.09	15,210	15,130	11.51
223	N. R. & Poca. Cons. Coal Co	No. 6 Pocahontas	A. R.	0.33	19.90	77.34	0.003	2.43	0.66	84.62	4.57	6.68	1.04	14,670	14,650	9.29
224	Samuel Gwinn	No. 6 Pocahontas	A. R.	1.09	21.16	75.39	0.005	2.36	0.43	85.16	4.51	6.54	1.00	14,670	14,850	9.57
	Average	No. 6 Pocahontas	A. R.	0.58	20.89	75.78	0.007	2.75	0.54	85.34	4.58	5.75	1.04	14,850	14,877	10.12
225	Beury Bros	No. 3 Pocahontas	A. R.	0.32	22.70	73.07	0.005	3.91	1.92	85.95	4.53	2.43	1.26	15,030	15,200	13.56

Table Showing Location of Mines and Openings Sampled, the Analyses of Which are Listed in Table 1, and Page References to Their Description.

[illegible]	[illegible] No.	Location of Mine.	Page of this Report
[illegible]		Near Crescent	464
[illegible]		[illegible] mile NW	464
[illegible]		Donwood, 0.4 mile SE	465
[illegible]		[illegible], [illegible] mile South	466-7
[illegible]		Kimberly, [illegible] mile SE	468
11		Belva, 1.1 miles North	476-7
[illegible]		Wyndal, [illegible] mile SE	477-8
14		Gamoca, 0.4 mile SE	478-9
17		Carbondale, 0.3 mile SE	501
[illegible]		Carbondale, 0.7 mile North	502-3
[illegible]		On Smithers Creek, 0.12 mi. E. Buffalo Fork	503-4
[illegible]		On Smithers Creek at Martine	504-6
24		Smithers, 0.4 mile SE	507
[illegible]		At Longacre	507-8
[illegible]		Longacre, ½ mile SE	509
[illegible]		Boomer, ½ mile SE	510
[illegible]		Boomer, 1.5 miles NE	511
[illegible]		Glen Ferris, ½ mile NW	512
[illegible]		Gauley Bridge, 0.7 mile NE	513-14
[illegible]		Gamoca, 0.4 mile SE	514-15
[illegible]		Wyndal, ½ mile SE	515-16
[illegible]	339R	Belva, 1.6 miles East	516
[illegible]	340R	Jodie, 1 mile SW	517
[illegible]	338R	Jodie, ½ mile SE	518
[illegible]		Donwood, ¼ mile SE	521-2
[illegible]		Donwood, [illegible] mile South	522
42		At Crescent	523
[illegible]		Eagle, [illegible] mile NW	524
44		At Eagle	524-5
45		Boomer, [illegible] mile due West	525-6
[illegible]		Mt. Carbon, 0.2 mile SW	529-30
47		Mt. Carbon, ½ mile SE	530
48		Gauley Bridge, ½ mile South	532-3
49		Kimberly, 0.1 mile SW	526-7
[illegible]		Columbia, 0.2 mile West	527-8
[illegible]		Page, 1.6 miles NE	538-48
[illegible]	930HK	Page, 2 miles N. 70° E.	537
[illegible]		[illegible], 0.4 mile SW	549
[illegible]		Hickory Camp, ½ mile NE	550
[illegible]		Ansted, 1 mile N. 20° W.	556-74
[illegible]		Ansted, [illegible] mile N. 45° W.	575
[illegible]		[illegible] (Willis Branch), 2½ miles NW	552-4
[illegible]		[illegible] (Willis Branch), 1.2 miles W.	554-6
[illegible]		Powellton, 2.2 miles SE	581-600
[illegible]		At Elk Ridge on Armstrong Creek	601-2
61		Elk Ridge, 0.8 mile South	602-3
[illegible]		[illegible], 0.4 mile NE	605-6
[illegible]		Hickory Camp, 0.6 mile due South	605
[illegible]		Keeferton, 1.8 miles S. 30° W.	606
[illegible]		[illegible], 0.9 mile S. 10° W.	607
[illegible]		Kingston, 1.8 miles S. 25° W.	608
[illegible]		Kingston, 1 mile due South	609
[illegible]		[illegible], 1.5 miles NE	617-18
[illegible]	[illegible]	[illegible], 0.9 mile NE	620
[illegible]		Montgomery, East edge of	623-4
[illegible]		At Crescent	624-5
[illegible]		[illegible], 0.4 mile NW	625-6
[illegible]		[illegible], SE edge of	626-7
[illegible]		[illegible], 1.5 miles NE	546-8, 630-5
[illegible]		Hickory Camp, [illegible] mile East	636-7

No. on Map II	Sample No.	Location of Mine.	Page of this Report
81	....	Hickory, ½ mile SE........................	637-8
81A	....	Krebs, 0.3 mile NE........................	638-9
82	....	Kingston, 1.7 miles due South..................	639
83	....	Keeferton, ¾ mile SW.....................	640
84	....	Kingston, 1.2 miles SW.....................	640-1
88	....	Kingston, 1.2 miles South..................	642
90	....	Herberton, ¾ mile West....................	644-5
91	256T	At Smithers..................................	649
92	913H	Ramsey, 0.8 mile N. 60° W..................	651
93	....	Parral (Summerlee), ¾ mile N. 15° W..........	656-7
94	908H	Herberton, 2 miles NW......................	659
95	909H	Herberton, ¾ mile S. 50° W..................	661
96	910H	Hico, 0.7 mile N. 70° W.....................	668
97	911H	Deitz, 0.65 mile S. 15° E....................	669
98	....	Herberton, ½ mile West.....................	675-6
99	917H	Kanawha Falls 0.1 mile East..................	301
100	912H	On Gauley River, 0.1 mile E. Horseshoe Creek....	679
454	308R	On Gauley River...............................	679
458	313R	Carnifex Ferry, 2¾ miles NW................	681
101	914H	Carnifex Ferry, 0.5 mile NW.................	681
103	....	Hawks Nest, 1.1 miles SE....................	684
105	....	At Elmo.....................................	685-6
106	....	At Michigan..................................	686
107	....	Fayette Station, 0.7 mile NW.................	686-7
109	....	At Nuttallburg................................	688
110	....	Mouth of Keeney Creek, ¾ mile NE...........	689-90
115	....	Winona, 0.8 mile due West..................	692-3
115A	....	Winona, 0.4 mile NE........................	693-4
117	....	Winona, 1.2 miles N. 30° E..................	694-5
119	....	Winona, 0.9 mile N. 60° E....................	696-7
120	....	Winona, 0.4 mile East.......................	697-700
122	....	Winona, 0.9 mile S. 50° E....................	700-1
125	918H	Russellville, 1.9 miles SW....................	702-3
126	915H	Nallen, just SW of..........................	703-4
127	....	Hawks Nest, 0.9 mile SE....................	705
128	....	At Whitney, NW. of Fayette Station..........	705-6
129	....	South Fayette Station, ½ mile West..........	706-7
130	....	Kaymoor, 0.6 mile West......................	707-8
131	....	At Brown.....................................	709-10
132	....	Elverton, 0.4 mile N. 35° W..................	711-12
133	....	Opposite Caperton...........................	712-13
134	....	Sewell, 0.6 mile West........................	714
135	....	Finlow (Brooklyn), 0.4 mile NW..............	714-17
137	....	Thurmond, 0.8 mile N. 10° W.................	717
142	....	Minden, West edge...........................	721-4
143	....	At Lochgelly (formerly Stuart)...............	724-6
144	....	At Summerlee (formerly Parral)..............	726-7
145	....	Stonecliff, 0.5 mile West.....................	728-9
147	....	Prudence, 1.4 miles due East................	730-1
151	....	Prudence, North edge of.....................	731-2
152	....	Harvey, ½ mile NW...........................	733-4
153	....	At Redstar....................................	734-7
155	....	At Glen Jean.................................	738-9
155A	....	Glen Jean, 0.4 mile SW......................	740-1
156	....	At Wingrove..................................	741-2
159	....	Carlisle, 0.3 mile NW........................	745-6
161	....	Sun. East edge of............................	747-63
163	....	At Derryhale..................................	764-7
164	....	Dunloup, SE edge of.........................	767
167	....	At Turkey Knob...............................	770-1
168	....	At Macdonald................................	771-6
169	....	Macdonald, ½ mile West.....................	776-7
172	....	Macdonald, ¾ mile SW.......................	778-9
173	....	Macdonald, 1.2 miles SW.....................	779-80
174	943H	Herberton, 0.3 mile North....................	782-3
181	....	At Clifftop....................................	788
184	919H	Corliss, ½ mile N. 10° W.....................	786
185	920H	Corliss, 1.7 miles S. 30° W..................	787
187	928H	Pittman, 0.3 mile S. 55° E..................	791

No. on Map II	Sample No.	Location of Mine.	Page of this Report
190	....	Thurmond, ½ mile due North..................	810
191	....	Thurmond, 1.3 miles NW......................	811-12
192	....	At Newlyn, 1 mile SW of Thurmond............	812-13
193	....	Thurmond, 1.5 miles due South...............	813
[illegible]	....	Terry, 0.4 mile North.......................	814
194	....	Fire Creek, 1 mile S. 10° E.................	816
196	....	Beury, ½ mile SW............................	817
197	....	Dimmock, ¼ mile West........................	818
198	....	Stonecliff, ½ mile East.....................	821-2
200	....	Stonecliff, 0.3 mile NE.....................	824-5
201	....	Alaska, 0.3 mile North......................	825-6
203	....	At Ephraim..................................	826-8
204	....	Thayer, 0.7 mile due South..................	828
207	....	Royal, 0.3 mile due South...................	[illegible]
209	....	Quinnimont, 2.4 miles NE....................	832-3
210	....	Lawton, 1 mile SW...........................	833-4
213	....	Lawton, 0.2 mile SW.........................	836
214	....	Lawton, 1.2 miles N. 50° W..................	837
221	....	Rainelle, 2.4 miles due South...............	850
222	....	Rainelle, 1 mile N. 20° E...................	852
223	....	Meadow Bridge (Clute) 1.7 miles N. 85° W....	858
224	....	Meadow Creek Station, 1.5 miles due N.......	860
225	....	Meadow Bridge (Clute), 1.8 miles N. 20° E...	865

Table 2—Coke Analyses by West Virginia Geological Survey.

No. on Map II	Mine.	Coal Bed	Moisture	Volatile Matter	Fixed Carbon	Ash	Sulphur	Phosphorus	Coking Time Hours	No. on Map II
17	Kanawha & Hocking C. & C. Co. (Mine 111)	No. 2 Gas	0.12	1.02	91.53	7.33	0.91	0.0135	72	17
19	Cannelton C. & C. Co. (No. 1)	No. 2 Gas	0.13	1.95	89.26	8.66	1.05	0.0215	72	19
23	Columbus Iron & Steel Co. (No. 1)	No. 2 Gas	0.70	0.95	85.45	12.90	0.47	0.012	48	23
25	Kanawha & Hocking C. & C. Co. (Longacre)	No. 2 Gas	0.22	1.64	88.59	9.55	1.11	0.0105	72	25
25A	Kanawha & Hocking C. & C. Co. (Longacre)	No. 2 Gas	0.15	0.69	86.43	12.73	1.15	0.0750	48	25A
46	Great Kanawha Col. Co. (No. 2)	No. 2 Gas	0.17	0.87	82.56	16.40	1.01	0.0259	72	46
52	Gauley Mountain Coal Co	No. 2 Gas	0.14	1.61	84.85	13.40	0.75	0.009	72	52
	Average	No. 2 Gas	0.23	1.25	86.95	11.57	0.93	0.021	......	.....
58	Mt. Carbon Co., Ltd. (Vulcan)	Powellton	0.05	0.64	91.49	7.82	0.72	0.0013	72	58
75	W. R. Johnson (No. 1)	Eagle	0.21	1.76	81.37	16.66	0.76	0.020	72	75
76	Kanawha Rail & River Coal Co. (Edgewater No. 1)	Eagle	0.17	0.87	84.71	14.25	0.83	0.020	72	76
77	St. Clair Coal Mining Co	Eagle	0.20	1.39	84.64	13.77	1.24	0.0125	72	77
	Average	Eagle	0.19	1.34	83.58	14.89	0.94	0.0175	......	.....
111	Sewell Colliery Co. (Caperton)	Sewell	0.05	0.84	93.94	5.17	0.68	0.010	72	111
129	Low Moor Iron Co. (Low Moor No. 2)	Sewell	0.52	2.83	87.73	8.92	0.83	0.013	72	129
130	Low Moor Iron Co. (Kaymoor No. 1)	Sewell	0.07	1.18	88.60	10.15	0.54	0.012	72	130
132	Branch Coal Co. (Chapman)	Sewall	0.13	0.92	92.09	6.86	0.56	0.007	48	132
135	Scotia Coal Co. (Brooklyn)	Sewell	0.10	1.27	91.89	6.74	0.60	0.008	72	135
142	N. R. & Poca. Cons. Coal Co. (Minden No. 2)	Sewell	0.08	0.73	92.89	6.30	0.66	0.014	72	142
152	Harvey C. & C. Co. (Harvey)	Sewell	0.12	0.59	91.82	7.47	0.76	0.011	48	152
155	New River Co. (Collins)	Sewell	0.07	0.78	90.37	8.78	1.02	0.005	18	155
161	New River Collieries Co. (Sun No. 1)	Sewell	0.16	0.93	92.03	6.88	1.06	0.006	72	161
167	Turkey Knob C. & C. Co. (Turkey Knob)	Sewell	0.06	0.81	91.33	7.80	0.81	0.009	72	167
168	New River C. & C. Co. (Macdonald)	Sewell	0.11	0.68	92.71	6.50	0.80	0.006	72	168
175	Longdale Iron Co. (Sewell)	Sewell	0.11	1.17	89.87	8.85	0.63	0.013	72	175
	Average	Sewell	0.14	1.06	91.26	7.54	0.75	0.0095	......	.....
194	Fire Creek C. & C. Co. (Fire Creek)	Fire Creek	0.07	0.92	90.17	8.84	0.54	0.063	72	194
198	Stone Cliff C. & C. Co	Fire Creek	0.29	1.02	92.19	6.50	0.76	0.009	72	198
200	Beechwood C. & C Co. (No. 1)	Fire Creek	0.04	1.34	92.30	6.32	0.45	0.0675	72	200
208	Quinnimont Coal Co	Fire Creek	0.11	0.67	90.68	8.54	0.86	0.099	72	208
214	Greenwood Coal Co	Fire Creek	0.15	0.96	93.21	5.68	0.60	0.075	72	214
	Average	Fire Creek	0.13	0.98	91.71	7.18	0.64	0.0627	......	.....

Table Showing Location of Mines Corresponding to Coke Analyses in Table 2, and Pages References to Their Description.

No. on Map II.	Location of Mine	Page of this Report
17	Carbondale, 0.5 mile SE	501
19	Carbondale, 0.7 mile N	502-3
25	On Smithers Creek at Marting	504-6
33	At Longacre	507-8
33A	Longacre, 1 mile SE	509
40	Mt. Carbon, 0.2 mile SW	529-30
52	Ansted, 1 mile N. 20° W	556-74
58	Powellton, 2.2 miles SE	581-600
75	At Crescent	624-5
76	Eagle, 0.4 mile NW	625-6
77	Eagle, SE edge of	626-7
111	At Caperton	690-1
129	South Fayette Station, ½ mile W	706-7
130	Kaymoor, 0.6 mile West	707-8
132	Elverton, 0.4 mile N. 35° W	711-12
135	Finlow (Brooklyn), 0.4 mile NW	714-17
142	Minden, West edge of	721-4
152	Harvey, ½ mile NW	733-4
155	At Glen Jean	738-9
161	Sun, E. edge of	747-63
167	At Turkey Knob	770-1
168	At Macdonald	771-6
175	Sewell, 0.3 mile East	783
194	Fire Creek, 1 mile S. 10° E	816
198	Stonecliff, ½ mile E	821-2
200	Stonecliff, 0.3 mile NE	824-5
208	Quinnimont, 0.8 mile S. 40° E	831-2
214	Lawton, 1.2 miles N. 50° W	837

Table 3—Coal Analyses by U. S. Geological Survey and U. S. Bureau of Mines.

No. on Map II.	Mine.	Coal Bed.	Laboratory Number.	Condition of Sample.	Proximate			Common to both.		Ultimate				Calorimeter B. T. U. for 1 lb. of Coal	Calculated B. T. U. for 1 lb. of Coal	Carbon Divided by Oxygen + Ash
					Moisture	Volatile Matter	Fixed Carbon	Ash	Sulphur	Carbon	Hydrogen	Oxygen	Nitrogen			
23	Columbus Iron & Steel Co. (No. 1)	No. 2 Gas	24055	A. R.	2.33	34.93	55.76	6.98	0.90	.....	....	.....	....	13,891	......	.....
23	Columbus Iron & Steel Co. (No. 1)	No. 2 Gas	24056	A. R.	2.73	35.33	57.31	4.63	1.00	.....	....	.....	....	14,170	......	.....
23	Columbus Iron & Steel Co. (No. 1)	No. 2 Gas	24057	A. R.	2.21	34.33	56.63	6.83	1.04	.....	....	.....	....	13 907	......	.....
23	Columbus Iron & Steel Co. (No. 1)	No. 2 Gas	24058	A. R.	2.72	34.31	56.47	6.50	0.74	.....	....	.....	....	13,928	......	.....
23	Columbus Iron & Steel Co. (No. 1)	No. 2 Gas	24059	A. R.	2.58	35.21	56.06	6.12	0.95	.....	....	.....	....	13,991	......	.....
23	Columbus Iron & Steel Co. (No. 1)	No. 2 Gas	24060	A. R.	2.40	35.24	56.43	5.93	0.84	.....	....	.....	....	14,018	......	.....
23	Columbus Iron & Steel Co. (No. 1)	No. 2 Gas	24061	A. R.	2.52	34.86	56.42	6.20	0.85	78.82	5.30	7.27	1.56	13,966	......	5.85
25	Kanawha & Hocking C. & C. Co. (Longacre—No. 114)	No. 2 Gas	23986	A. R.	2.56	36.22	56.99	4.23	0.90	.....	....	.....	....	14,355	......	.....
25	Kanawha & Hocking C. & C. Co. (Longacre—No. 114)	No. 2 Gas	23987	A. R.	2.55	35.83	56.70	4.92	0.81	.....	....	.....	....	14,296	......	.....
25	Kanawha & Hocking C. & C. Co. (Longacre—No. 114)	No. 2 Gas	23988	A. R.	2.30	35.03	56.95	5.72	0.91	.....	....	.....	....	14,164	......	.....
25	Kanawha & Hocking C. & C. Co. (Longacre—No. 114)	No. 2 Gas	23989	A. R.	2.38	36.36	57.51	3.75	0.96	.....	....	.....	....	14,483	......	.....
25	Kanawha & Hocking C. & C. Co. (Longacre—No. 114)	No. 2 Gas	23990	A. R.	2.32	33.65	55.89	8.14	1.44	.....	....	.....	....	13,739	......	.....
25	Kanawha & Hocking C. & C. Co. (Longacre—No. 114)	No. 2 Gas	23991	A. R.	2.61	35.12	55.68	6.59	1.34	.....	....	.....	....	13,979	......	.....
25	Kanawha & Hocking C. & C. Co. (Longacre—No. 114)	No. 2 Gas	23992	A. R.	2.42	35.45	56.68	5.45	1.02	78.92	5.37	7.72	1.52	14,159	......	6.00
36	Gauley Mountain Coal Co.	No. 2 Gas	10476	A. R.	1.80	44.90	49.86	3.44	0.87	80.57	6.96	6.65	1.51	15,330	......	7.99
51	Loup Creek Col. Co. (Page)	No. 2 Gas	5439	A. R.	2.65	29.69	63.50	4.16	1.29	.....	....	.....	....	14,587	......	.....
51	Loup Creek Col. Co. (Page)	No. 2 Gas	6933	A. R.	3.32	28.88	62.72	5.08	0.80	79.73	5.29	7.73	1.37	14,209	......	6.22
51	Loup Creek Col. Co. (Page) (L. B.)	No. 2 Gas	1867	A. R.	5.48	29.70	62.53	2.29	0.79	.....	....	.....	1.41	14,454	......	.....
51	Loup Creek Col. Co. (Page) (U. B.)	No. 2 Gas	1868	A. R.	2.93	31.95	60.17	4.95	1.22	.....	....	.....	....	......	......	.....
51	Loup Creek Col. Co. (Page)	No. 2 Gas	2177	A. R.	2.82	31.40	61.37	4.41	1.40	.....	....	.....	....	......	......	.....
51	Loup Creek Col. Co. (Page)	No. 2 Gas	2028	A. R.	3.74	31.04	61.31	3.91	0.89	80.50	5.31	8.07	1.32	14,436	......	6.72
52	Gauley Mountain Coal Co.	No. 2 Gas	1257	A. R.	1.90	33.34	59.89	4.87	0.64	.....	....	.....	....	14,452	......	.....
52	Gauley Mountain Coal Co.	No. 2 Gas	1257	A. D.	1.31	33.54	60.25	4.90	0.64	.....	....	.....	....	14,539	......	.....
52	Gauley Mountain Coal Co.	No. 2 Gas	1258	A. R.	1.84	33.90	58.40	6.76	0.89	.....	....	.....	....	......	......	.....
52	Gauley Mountain Coal Co.	No. 2 Gas	1258	A. D.	1.25	33.20	58.75	6.80	0.89	.....	....	.....	....	......	......	.....
52	Gauley Mountain Coal Co.	No. 2 Gas	1515	A. R.	4.16	31.28	57.39	7.17	0.90	76.70	5.32	8.57	1.34	13,786	13,822	4.87
52	Gauley Mountain Coal Co.	No. 2 Gas	1515	A. D.	1.60	32.12	58.92	7.36	0.92	78.75	5.16	6.43	1.38	14,153	14 091	5.71
	Average	No. 2 Gas	......	A. R.	2.72	34.04	57.86	5.38	0.97	79.21	5.59	7.67	1.43	14,205	......	6.15
	Average	No. 2 Gas	......	A. D.	1.39	32.95	59.31	6.35	0.82	.....	....	.....	....	14,346	......	.....
58	Mt. Carbon Co., Ltd. (Vulcan)	Powellton	1208	A. R.	1.98	34.41	59.85	3.76	0.85	.....	....	.....	....	14,738	......	.....
58	Mt. Carbon Co., Ltd. (Vulcan)	Powellton	1208	A. D.	0.99	34.76	60.45	3.80	0.86	.....	....	.....	....	14,888	......	.....
58	Mt. Carbon Co., Ltd. (Vulcan)	Powellton	1209	A. D.	1.77	32.53	62.76	2.94	0.74	.....	....	.....	....	......	......	.....
58	Mt. Carbon Co., Ltd. (Vulcan)	Powellton	1209	A. R.	1.18	32.72	63.14	2.96	0.75	.....	....	.....	....	......	......	.....
58	Mt. Carbon Co., Ltd. (Vulcan)	Powellton	1561	A. R.	4.08	28.61	60.73	6.58	0.77	76.89	5.23	8.95	1.58	13,925	13,761	4.95
58	Mt. Carbon Co., Ltd. (Vulcan)	Powellton	1561	A. D.	1.01	29.53	62.67	6.79	0.80	79.35	5.04	6.39	1.63	14,371	14,202	6.02
	Average	Powellton	......	A. R.	2.61	31.85	61.11	4.43	0.79	.....	....	.....	....	14,332	......	.....
	Average	Powellton	......	A. D.	1.06	32.34	62.09	4.51	0.80	.....	....	.....	....	14,630	......	.....

Table 3—Coal Analyses by U. S. Geological Survey and U. S. Bureau of Mines—(Continued).

No. on Map II	Mine.	Coal Bed.	Laboratory Number.	Condition of Sample.		Proximate			Common to both.		Ultimate				Calorimeter B. T. U. for 1 lb. of Coal	Calculated B. T. U. for 1 lb. of Coal	Carbon Divided by Oxygen + Ash
						Moisture	Volatile Matter	Fixed Carbon	Ash	Sulphur	Carbon	Hydrogen	Oxygen	Nitrogen			
[illegible]	[illegible] C. & C. Co. (No. 2 North)	Eagle	23487	A.	R.	2.84	33.26	59.86	4.04	0.61	....	....	....	....	14,375	.....	....
[illegible]	[illegible] C. & C. Co. (No. 2 North)	Eagle	23488	A.	R.	3.39	33.36	58.79	4.46	0.84	....	....	....	....	14,206	.....	....
[illegible]	[illegible] C. & C. Co. (No. 2 North)	Eagle	23489	A.	R.	2.96	33.57	59.18	4.29	0.78	80.01	5.49	7.83	1.60	14,292	.....	6.60
[illegible]	Loup Creek Coal Co. (No. 8)	Eagle	6932	A.	R.	2.39	31.72	61.33	4.56	1.62	79.85	5.09	7.76	1.12	14,465	.....	6.48
[illegible]	Loup Creek Coal Co. (No. 8) (L. B.)	Eagle	1869	A.	R.	3.53	29.36	64.77	2.34	0.92	....	....	....	....	.....	.....	....
[illegible]	Loup Creek Coal Co. (No. 8) (M. B.)	Eagle	1870	A.	R.	2.96	30.23	59.37	7.44	1.04	....	....	....	....	13,972	.....	....
[illegible]	Loup Creek Coal Co. (No. 8)	Eagle	2178	A.	R.	4.11	29.08	59.36	7.45	0.80	....	....	....	....	.....	.....	....
[illegible]	Loup Creek Coal Co. (No. 8)	Eagle	2004	A.	R.	5.09	29.07	62.57	3.27	1.03	78.23	5.33	10.63	1.51	14,110	.....	5.63
[illegible]	Herbert Collieries Co.	Eagle	8993	A.	R.	3.10	25.50	67.40	4.00	0.70	....	....	....	....	.....	.....	....
[illegible]	Herbert Collieries Co.	Eagle	8904	A.	R.	3.50	24.50	66.70	5.30	0.75	....	....	....	....	.....	.....	....
[illegible]	Herbert Collieries Co.	Eagle	8905	A.	R.	3.00	25.00	68.20	3.80	0.60	....	....	....	....	.....	.....	....
[illegible]	Herbert Collieries Co.	Eagle	8937	A.	R.	3.30	25.50	66.77	4.43	0.73	81.66	5.23	6.50	1.45	14,500	.....	7.47
	Average	Eagle	.....	A.	R.	3.35	29.18	62.86	4.61	0.87	79.94	5.28	8.18	1.42	14,268	.....	6.49
[illegible]	Stuart Colliery Co. (Beech Creek)	Little Eagle	8173	A.	R.	3.00	28.00	63.40	5.60	0.97	79.73	5.34	6.85	1.51	14,210	.....	6.42
102	Mill Creek Colliery Co.	Sewell	8179	A.	R.	7.10	22.50	67.20	3.20	0.55	....	....	....	....	.....	.....	....
102	Mill Creek Colliery Co.	Sewell	8178	A.	R.	3.20	25.00	68.40	3.40	0.55	....	....	....	....	.....	.....	....
102	Mill Creek Colliery Co.	Sewell	8288	A.	R.	5.00	24.50	67.20	3.30	0.55	80.06	5.12	9.59	1.38	14,280	14,100	6.21
102	Mill Creek Colliery Co.	Sewell	8288	A.	D.	1.10	25.50	69.97	3.43	0.57	83.40	4.88	6.28	1.44	14,880	.....	8.59
102	Mill Creek Colliery Co.	Sewell	14358	A.	R.	3.14	28.10	65.30	3.46	0.56	....	....	....	....	.....	.....	....
102	Mill Creek Colliery Co.	Sewell	14359	A.	R.	2.60	28.75	63.81	4.84	0.78	....	....	....	....	.....	.....	....
102	Mill Creek Colliery Co.	Sewell	14360	A.	R.	2.66	28.10	65.66	3.58	0.55	....	....	....	....	.....	.....	....
102	Mill Creek Colliery Co.	Sewell	14361	A.	R.	3.31	27.74	65.27	3.68	0.56	....	....	....	....	.....	.....	....
102	Mill Creek Colliery Co.	Sewell	14362	A.	R.	3.00	28.00	65.18	3.82	0.61	81.65	5.11	7.22	1.59	14,423	.....	7.39
104	Sunbury C. & C. Co. (Sunnyside)	Sewell	8068	A.	R.	2.70	23.50	70.50	3.30	0.50	....	....	....	....	.....	.....	....
104	Sunbury C. & C. Co. (Sunnyside)	Sewell	8069	A.	R.	2.90	23.50	70.00	3.60	0.60	....	....	....	....	.....	.....	....
104	Sunbury C. & C. Co. (Sunnyside)	Sewell	8244	A.	R.	2.60	22.50	71.20	3.70	0.50	....	....	....	....	.....	.....	....
104	Sunbury C. & C. Co. (Sunnyside)	Sewell	8287	A.	R.	2.80	23.50	70.18	3.52	0.54	82.48	4.97	7.04	1.45	14,650	14,560	7.81
104	Sunbury C. & C. Co. (Sunnyside)	Sewell	8287	A.	D.	0.90	24.00	71.51	3.59	0.55	84.08	4.85	5.45	1.48	14,940	.....	9.30
107	Ajax Coal Co. (Ajax)	Sewell	8216	A.	R.	2.46	22.21	72.21	3.12	0.60	....	....	....	....	14,756	.....	....
107	Ajax Coal Co. (Ajax)	Sewell	8217	A.	R.	3.22	22.28	71.68	2.82	0.55	83.07	5.11	6.89	1.56	14,702	.....	8.55
107	Ajax Coal Co. (Ajax)	Sewell	8704	A.	R.	3.10	21.50	72.50	2.90	0.55	....	....	....	....	.....	.....	....
107	Ajax Coal Co. (Ajax)	Sewell	8705	A.	R.	3.20	22.00	70.70	4.10	0.65	....	....	....	....	.....	.....	....
107	Ajax Coal Co. (Ajax)	Sewell	9147	A.	R.	3.30	22.00	71.23	3.47	0.58	82.16	4.97	7.30	1.52	14,630	.....	7.63
110	Aileen Coal Co. (Keeneys Creek)	Sewell	8140	A.	R.	3.20	22.00	70.60	4.20	0.65	....	....	....	....	.....	.....	....
110	Aileen Coal Co. (Keeneys Creek)	Sewell	8141	A.	R.	4.10	20.00	73.70	2.20	0.50	....	....	....	....	.....	.....	....
110	Aileen Coal Co. (Keeneys Creek)	Sewell	8190	A.	R.	3.50	21.00	72.25	3.25	0.56	82.13	5.11	7.09	1.56	14,550	14,630	7.97
110	Aileen Coal Co. (Keeneys Creek)	Sewell	8191	A.	D.	1.00	21.50	74.16	3.34	0.57	84.63	4.95	4.91	1.60	14,940	.....	10.26
111	Sewell Colliery Co. ([illegible])	Sewell	14314	A.	R.	3.99	24.29	68.78	2.94	0.56	....	....	....	....	14,490	.....	....

Table 3—Coal Analyses by U. S. Geological Survey and U. S. Bureau of Mines—(Continued).

No. on Map II.	Mine.	Coal Bed.	Laboratory Number.	Condition of Sample.	Proximate			Common to both.		Ultimate				Calorimeter B. T. U. for 1 lb. of Coal	Calculated B. T. U. for 1 lb. of Coal	Carbon Divided by Oxygen + Ash
					Moisture	Volatile Matter	Fixed Carbon	Ash	Sulphur	Carbon	Hydrogen	Oxygen	Nitrogen			
111	Sewell Colliery Co. (Caperton)	Sewell	14345	A. R.	4.70	23.81	69.63	1.86	0.50	.....	....	.....	....	14,605	......	.....
111	Sewell Colliery Co. (Caperton)	Sewell	14346	A. R.	3.28	24.37	70.44	1.91	0.53	.....	....	.....	....	14,792	......	.....
111	Sewell Colliery Co. (Caperton)	Sewell	14347	A. R.	3.97	23.84	69.97	2.22	0.56	83.37	5.08	7.15	1.62	14,609	......	8.90
111	Sewell Colliery Co. (Caperton)	Sewell	14348	A. R.	3.49	23.75	70.09	2.67	0.57	.....	....	.....	....	14,647	......	.....
111	Sewell Colliery Co. (Caperton)	Sewell	14349	A. R.	2.89	25.47	69.28	2.36	0.53	.....	....	.....	....	14,823	......	.....
111	Sewell Colliery Co. (Caperton)	Sewell	14350	A. R.	3.22	24.54	69.70	2.54	0.55	83.80	5.16	6.28	1.67	14,706	......	9.50
115	Keeneys Creek Colliery Co. (Lower Boone)	Sewell	8137	A. R.	3.32	23.28	71.02	2.38	0.76	.....	....	.....	....	......	......	.....
115	Keeneys Creek Colliery Co. (Lower Boone)	Sewell	8138	A. R.	3.55	22.58	72.01	1.86	0.63	.....	....	.....	....	......	......	.....
115	Keeneys Creek Colliery Co. (Lower Boone)	Sewell	8139	A. R.	3.70	22.03	71.55	2.72	0.60	.....	....	.....	....	......	......	.....
115	Keeneys Creek Colliery Co. (Lower Boone)	Sewell	8193	A. R.	3.54	22.24	71.85	2.37	0.65	83.38	5.22	6.86	1.52	14,688	......	9.03
117	Blume C. & C. Co. (Blume)	Sewell	8149	A. R.	3.60	24.00	68.90	3.50	0.55	.....	....	.....	....	......	......	.....
117	Blume C. & C. Co. (Blume)	Sewell	8150	A. R.	2.80	22.50	69.90	4.80	0.50	.....	....	.....	....	......	......	.....
117	Blume C. & C. Co. (Blume)	Sewell	8156	A. R.	3.40	23.00	71.40	2.20	0.50	.....	....	.....	....	14,680	......	.....
117	Blume C. & C. Co. (Blume)	Sewell	8609	A. R.	3.52	22.66	71.89	1.93	0.55	.....	....	.....	....	14,728	......	.....
117	Blume C. & C. Co. (Blume)	Sewell	8194	A. R.	3.20	23.50	69.13	4.17	0.54	81.34	5.05	7.43	1.47	14,380	......	7.01
118	Lookout C. & C. Co. (Lookout)	Sewell	8135	A. R.	4.03	24.00	67.82	4.15	0.77	.....	....	.....	....	......	......	.....
118	Lookout C. & C. Co. (Lookout)	Sewell	8136	A. R.	3.22	24.36	69.75	2.67	0.75	.....	....	.....	....	......	......	.....
118	Lookout C. & C. Co. (Lookout)	Sewell	8189	A. R.	3.71	23.53	69.37	3.39	0.80	82.06	5.14	7.14	1.47	14,306	14 603	7.79
118	Lookout C. & C. Co. (Lookout)	Sewell	8189	A. D.	1.14	24.16	71.22	3.48	0.82	84.25	4.98	4.96	1.51	14,688	......	9.98
119	Rothwell Coal Co. (Dubree)	Sewell	8147	A. R.	2.80	24.50	69.70	3.00	0.50	.....	....	.....	....	......	......	.....
119	Rothwell Coal Co. (Dubree)	Sewell	8148	A. R.	3.20	23.50	68.80	4.50	0.65	.....	....	.....	....	......	......	.....
119	Rothwell Coal Co. (Dubree)	Sewell	8191	A. R.	3.00	24.50	68.72	3.78	0.59	81.61	5.02	7.45	1.55	14,450	......	7.27
120	Keeneys Creek Colliery Co. (Smokeless)	Sewell	5467	A. R.	3.22	23.53	71.16	2.09	0.57	.....	....	.....	....	14,780	......	.....
120	Keeneys Creek Colliery Co. (Smokeless)	Sewell	5468	A. R.	3.34	23.67	71.15	1.84	0.56	.....	....	.....	....	14,733	......	.....
120	Keeneys Creek Colliery Co. (Smokeless)	Sewell	5709	A. R.	3.98	23.21	67.41	5.40	0.66	79.56	5.31	7.73	1.34	14,238	......	6.06
120	Keeneys Creek Colliery Co. (Smokeless)	Sewell	5711	A. R.	4.71	23.80	66.18	5.31	0.68	78.53	5.09	9.02	1.37	14,105	......	5.48
120	Keeneys Creek Colliery Co. (Smokeless)	Sewell	8132	A. R.	3.19	23.04	71.54	2.23	0.68	.....	....	.....	....	......	......	.....
120	Keeneys Creek Colliery Co. (Smokeless)	Sewell	8133	A. R.	3.71	21.77	72.05	2.47	0.68	.....	....	.....	....	......	......	.....
120	Keeneys Creek Colliery Co. (Smokeless)	Sewell	8134	A. R.	3.13	23.22	71.73	1.92	0.57	.....	....	.....	....	......	......	.....
120	Keeneys Creek Colliery Co. (Smokeless)	Sewell	8186	A. R.	3.41	22.54	71.81	2.24	0.61	84.02	5.10	6.37	1.66	14,710	14,911	9.76
120	Keeneys Creek Colliery Co. (Smokeless)	Sewell	8186	A. D.	1.44	23.00	73.27	2.29	0.62	85.73	4.98	4.69	1.69	15,010	......	12.28
122	Ballinger Coal Co (No. 1)	Sewell	8146	A. R.	4.20	22.50	70.80	2.50	0.55	.....	....	.....	....	......	......	.....
122	Ballinger Coal Co (No. 1)	Sewell	8154	A. R.	3.50	23.00	71.10	2.40	0.65	.....	....	.....	....	......	......	.....
122	Ballinger Coal Co (No. 1)	Sewell	8155	A. R.	3.50	22.50	68.10	5.90	0.60	.....	....	.....	....	14,170	......	.....
122	Ballinger Coal Co (No. 1)	Sewell	8608	A. R.	3.32	23.20	69.87	3.61	0.65	.....	....	.....	....	14,571	......	.....
122	Ballinger Coal Co (No. 1)	Sewell	8195	A. R.	3.70	23.00	70.83	2.47	0.59	83.10	5.10	7.24	1.50	14,590	......	8.56
129	Low Moor Iron Co. (Low Moor No. 2)	Sewell	14401	A. R.	2.79	26.25	68.09	2.87	0.50	.....	....	.....	....	......	......	.....
129	Low Moor Iron Co. (Low Moor No. 2)	Sewell	14402	A. R.	3.02	26.00	68.60	2.38	0.50	.....	....	.....	....	......	......	.....

Table 3—Coal Analyses by U. S. Geological Survey and U. S. Bureau of Mines—(Continued).

No. on Map II	Mine	Coal Bed	Laboratory Number	Condition of Sample	Proximate			Common to both		Ultimate				Calorimeter B. T. U. for 1 lb. of Coal	Calculated B. T. U. for 1 lb. of Coal	Carbon Divided by Oxygen + Ash
					Moisture	Volatile Matter	Fixed Carbon	Ash	Sulphur	Carbon	Hydrogen	Oxygen	Nitrogen			
129	Low Moor Iron Co. (Low Moor No. 2)	Sewell	14403	A. R.	3.11	25.67	67.05	4.17	0.56	.....	.....	.....	.....	.....	.....	.....
129	Low Moor Iron Co. (Low Moor No. 2)	Sewell	14404	A. R.	3.03	25.73	68.11	3.13	0.57	82.73	5.14	6.78	1.65	14,605	.....	8.35
130	Low Moor Iron Co. (Kay Moor No. 1)	Sewell	14294	A. R.	3.00	25.22	68.28	3.50	0.55	.....	.....	.....	.....	.....	.....	.....
130	Low Moor Iron Co. (Kay Moor No. 1)	Sewell	14295	A. R.	3.41	25.09	69.17	2.33	0.60	.....	.....	.....	.....	.....	.....	.....
130	Low Moor Iron Co. (Kay Moor No. 1)	Sewell	14296	A. R.	3.11	26.03	67.32	3.54	0.60	.....	.....	.....	.....	.....	.....	.....
130	Low Moor Iron Co. (Kay Moor No. 1)	Sewell	14297	A. R.	3.12	25.58	69.02	2.28	0.54	.....	.....	.....	.....	.....	.....	.....
130	Low Moor Iron Co. (Kay Moor No. 1)	Sewell	14298	A. R.	3.17	25.11	68.81	2.91	0.52	82.59	5.09	7.26	1.63	14,584	.....	8.19
130	Low Moor Iron Co. (Kay Moor No. 1)	Sewell	14299	A. R.	3.17	25.24	67.89	3.70	0.51	82.05	4.97	7.10	1.67	14,499	.....	7.60
131	Brown Coal Co. (South Nuttall)	Sewell	8142	A. R.	3.20	21.50	73.40	1.90	0.50	.....	.....	.....	.....	.....	.....	.....
131	Brown Coal Co. (South Nuttall)	Sewell	8143	A. R.	3.30	23.00	71.80	1.90	0.45	.....	.....	.....	.....	14,830	.....	.....
131	Brown Coal Co. (South Nuttall)	Sewell	8144	A. R.	3.60	21.50	73.00	1.90	0.55	.....	.....	.....	.....	.....	.....	.....
131	Brown Coal Co. (South Nuttall)	Sewell	8145	A. R.	3.30	23.00	70.40	3.30	0.65	.....	.....	.....	.....	.....	.....	.....
131	Brown Coal Co. (South Nuttall)	Sewell	8607	A. R.	3.40	22.00	72.00	2.60	0.50	.....	.....	.....	.....	14,730	.....	.....
131	Brown Coal Co. (South Nuttall)	Sewell	8196	A. R.	3.30	22.50	71.77	2.43	0.58	84.36	5.22	5.87	1.54	14,780	15,080	10.16
131	Brown Coal Co. (South Nuttall)	Sewell	8196	A. D.	0.90	23.00	73.61	2.49	0.59	86.43	5.07	3.84	1.58	15,150	.....	13.65
131	Brown Coal Co. (South Nuttall)	Sewell	10618	A. R.	3.63	23.70	70.10	2.57	0.70	.....	.....	.....	.....	.....	.....	.....
131	Brown Coal Co. (South Nuttall)	Sewell	10619	A. R.	3.36	24.88	68.62	3.14	0.68	.....	.....	.....	.....	.....	.....	.....
131	Brown Coal Co. (South Nuttall)	Sewell	10620	A. R.	3.81	23.32	70.16	2.71	0.52	.....	.....	.....	.....	.....	.....	.....
131	Brown Coal Co. (South Nuttall)	Sewell	10621	A. R.	3.45	23.91	70.39	2.25	0.55	.....	.....	.....	.....	.....	.....	.....
131	Brown Coal Co. (South Nuttall)	Sewell	10622	A. R.	3.32	24.92	69.35	2.41	0.51	.....	.....	.....	.....	.....	.....	.....
131	Brown Coal Co. (South Nuttall)	Sewell	10623	A. R.	3.51	24.76	69.00	2.73	0.58	83.06	5.17	6.89	1.57	14,663	.....	8.62
132	Branch Coal Co. (Claremont)	Sewell	14338	A. R.	2.66	26.10	68.70	2.54	0.53	.....	.....	.....	.....	.....	.....	.....
132	Branch Coal Co. (Claremont)	Sewell	14339	A. R.	3.18	24.47	70.23	2.12	0.51	.....	.....	.....	.....	.....	.....	.....
132	Branch Coal Co. (Claremont)	Sewell	14340	A. R.	2.89	25.61	69.18	2.32	0.55	84.11	4.99	6.39	1.61	14,796	.....	9.66
132	Branch Coal Co. (Claremont)	Sewell	14341	A. R.	2.73	25.61	69.36	2.30	0.66	.....	.....	.....	.....	.....	.....	.....
132	Branch Coal Co. (Claremont)	Sewell	14342	A. R.	3.26	24.59	69.65	2.50	0.57	.....	.....	.....	.....	.....	.....	.....
132	Branch Coal Co. (Claremont)	Sewell	14343	A. R.	2.99	25.27	69.36	2.38	0.65	83.68	5.06	6.53	1.70	14,765	.....	9.39
133	Southside Co. (Southside)	Sewell	8151	A. R.	3.43	20.98	73.56	2.03	0.55	.....	.....	.....	.....	.....	.....	.....
133	Southside Co. (Southside)	Sewell	8152	A. R.	3.48	21.38	73.31	1.83	0.55	.....	.....	.....	.....	.....	.....	.....
133	Southside Co. (Southside)	Sewell	8153	A. R.	3.23	20.88	73.64	2.25	0.57	.....	.....	.....	.....	.....	.....	.....
133	Southside Co. (Southside)	Sewell	8185	A. R.	3.35	21.25	73.25	2.15	0.55	84.12	5.11	6.48	1.59	14,738	14,924	9.75
133	Southside Co. (Southside)	Sewell	8185	A. D.	0.87	21.79	75.13	2.21	0.56	86.28	4.95	4.37	1.63	15,116	.....	13.11
135	Scotia Coal Co. (Brooklyn)	Sewell	8092	A. R.	3.66	21.46	72.87	2.01	0.77	.....	.....	.....	.....	.....	.....	.....
135	Scotia Coal Co. (Brooklyn)	Sewell	8093	A. R.	3.26	20.22	73.64	2.88	0.75	.....	.....	.....	.....	.....	.....	.....
135	Scotia Coal Co. (Brooklyn)	Sewell	8094	A. R.	3.55	21.45	73.12	1.88	0.66	.....	.....	.....	.....	.....	.....	.....
135	Scotia Coal Co. (Brooklyn)	Sewell	8159	A. R.	3.34	21.25	73.18	2.23	0.56	84.16	5.13	6.34	1.55	14,821	.....	9.82
135	Scotia Coal Co. (Brooklyn)	Sewell	5329	A. R.	3.83	20.27	74.04	1.86	0.53	.....	.....	.....	.....	15,003	.....	.....
135	Scotia Coal Co. (Brooklyn)	Sewell	5432	A. R.	3.20	21.82	72.83	2.15	0.51	.....	.....	.....	.....	14,594	.....	.....

Table 3—Coal Analyses by U. S. Geological Survey and U. S. Bureau of Mines—(Continued).

No. on Map II.	Mine.	Coal Bed.	Laboratory Number.	Condition of Sample.	Proximate			Common to both.		Ultimate				Calorimeter B. T. U. for 1 lb. of Coal	Calculated B. T. U. for 1 lb. of Coal	Carbon Divided by Oxygen + Ash
					Moisture	Volatile Matter	Fixed Carbon	Ash	Sulphur	Carbon	Hydrogen	Oxygen	Nitrogen			
135	Scotia Coal Co. (Brooklyn)	Sewell	5453	A. R.	3.37	21.80	70.74	4.09	0.58	82.19	5.06	6.74	1.34	14,522	......	7.59
135	Scotia Coal Co. (Brooklyn)	Sewell	5480	A. R.	2.52	21.28	68.20	8.00	0.68	78.71	4.73	6.57	1.31	13,997	......	5.40
139	New River & Poca. Cons. Coal Co. (Minden No. 5)	Sewell	8032	A. R.	2.61	20.39	74.31	2.69	0.59	.....	....	.....	....	......	......	.....
139	New River & Poca. Cons. Coal Co. (Minden No. 5)	Sewell	8033	A. R.	2.68	21.62	71.73	3.97	1.72	.....	....	.....	....	......	......	.....
139	New River & Poca. Cons. Coal Co. (Minden No. 5)	Sewell	8034	A. R.	2.74	20.73	74.30	2.23	0.56	.....	....	.....	....	......	......	.....
139	New River & Poca. Cons. Coal Co. (Minden No. 5)	Sewell	8101	A. R.	2.75	21.58	72.72	2.95	1.07	81.27	5.04	5.17	1.50	14,848	......	10.38
140	New River & Poca. Cons. Coal Co. (Minden No. 4)	Sewell	8029	A. R.	3.26	20.08	74.61	2.05	0.56	.....	....	.....	....	......	......	.....
140	New River & Poca. Cons. Coal Co. (Minden No. 4)	Sewell	8030	A. R.	2.96	22.31	71.93	2.77	0.63	.....	....	.....	....	......	......	.....
140	New River & Poca. Cons. Coal Co. (Minden No. 4)	Sewell	8031	A. R.	2.61	22.57	71.88	2.94	0.64	.....	....	.....	....	......	......	.....
140	New River & Poca. Cons. Coal Co. (Minden No. 4)	Sewell	8102	A. R.	2.89	21.16	73.31	2.64	0.73	83.87	5.19	5.97	1.60	14,785	14,981	9.74
140	New River & Poca. Cons. Coal Co. (Minden No. 4)	Sewell	8102	A. D.	0.60	21.66	75.04	2.70	0.75	85.81	5.05	4.02	1.64	15,133	......	12.77
141	New River & Poca. Cons. Coal Co. (Minden No. 3)	Sewell	8027	A. R.	2.48	21.84	71.16	4.52	1.34	.....	....	.....	....	......	......	.....
141	New River & Poca. Cons. Coal Co. (Minden No. 3)	Sewell	8028	A. R.	3.21	20.15	73.51	3.13	0.76	.....	....	.....	....	......	......	.....
141	New River & Poca. Cons. Coal Co. (Minden No. 3)	Sewell	8381	A. R.	2.95	17.12	77.21	2.69	0.54	.....	....	.....	....	14,816	......	.....
141	New River & Poca. Cons. Coal Co. (Minden No. 3)	Sewell	8886	A. R.	2.50	21.50	72.70	3.30	1.05	.....	....	.....	....	14,750	......	.....
141	New River & Poca. Cons. Coal Co. (Minden No. 3)	Sewell	8249	A. R.	2.88	20.68	72.58	3.86	1.06	82.66	4.88	6.04	1.50	14,629	14,621	8.35
141	New River & Poca. Cons. Coal Co. (Minden No. 2)	Sewell	8249	A. D.	0.70	21.15	74.20	3.95	1.08	84.52	4.74	4.18	1.53	14,958	......	10.16
142	New River & Poca. Cons. Coal Co. (Minden No. 2)	Sewell	8024	A. R.	3.09	22.10	69.73	5.08	2.02	.....	....	.....	....	......	......	.....
142	New River & Poca. Cons. Coal. Co. (Minden No. 2)	Sewell	8025	A. R.	2.61	22.28	71.92	3.19	1.32	.....	....	.....	....	......	......	.....
142	New River & Poca. Cons. Coal Co. (Minden No. 2)	Sewell	8026	A. R.	2.79	20.61	72.12	4.48	1.42	.....	....	.....	....	......	......	.....
142	New River & Poca. Cons. Coal Co. (Minden No. 2)	Sewell	8881	A. R.	3.40	21.00	72.40	3.20	0.60	.....	....	.....	....	14,670	......	.....
142	New River & Poca. Cons. Coal Co. (Minden No. 2)	Sewell	8882	A. R.	3.10	21.00	72.50	3.40	1.25	.....	....	.....	....	14,720	......	.....
142	New River & Poca. Cons. Coal Co. (Minden No. 2)	Sewell	8107	A. R.	2.90	21.57	71.18	4.35	1.66	82.15	4.91	5.31	1.56	14,533	14,665	8.48
142	New River & Poca. Cons. Coal Co. (Minden No. 2)	Sewell	8107	A. D.	0.72	22.06	72.77	4.45	1.70	84.00	4.81	3.44	1.60	14 861	......	10.65
	New River & Poca. Cons., Coal Co. (Minden)	Sewell & Fire Ck. (?)	5774	A. R.	3.80	21.32	67.30	7.58	0.58	79.02	4.81	6.70	1.31	14,009	......	5.53
	New River & Poca. Cons., Coal Co. (Minden)	Sewell & Fire Ck. (?)	5775	A. R.	3.73	20.29	70.09	5.89	0.58	80.86	5.18	6.10	1.39	14,292	......	6.74
	New River & Poca. Cons., Coal Co. (Minden)	Sewell & Fire Ck. (?)	5776	A. R.	5.70	20.48	67.31	6.51	0.54	79.95	5.18	6.54	1.28	13,817	......	6.13
	New River & Poca. Cons., Coal Co. (Minden)	Sewell & Fire Ck. (?)	5777	A. R.	5.90	20.85	69.81	3.41	0.52	80.15	5.21	9.00	1.38	14,391	......	6.47
143	New River Co. (Lochgelly) (Stuart)	Sewell	7872	A. R.	2.81	22.79	71.72	2.65	0.49	.....	....	.....	....	14,719	......	.....
143	New River Co. (Lochgelly) (Stuart)	Sewell	7873	A. R.	3.78	21.20	72.71	2.31	0.52	.....	....	.....	....	14,702	......	.....
143	New River Co. (Lochgelly) (Stuart)	Sewell	8079	A. R.	3.03	22.45	71.25	3.27	0.57	.....	....	.....	....	......	......	.....
143	New River Co. (Lochgelly) (Stuart)	Sewell	8158	A. R.	3.39	21.49	72.35	2.77	0.60	83.48	5.15	6.17	1.53	14,663	14,857	9.03
143	New River Co. (Lochgelly) (Stuart)	Sewell	8158	A. D.	1.12	22.00	74.04	2.84	0.61	85.45	5.00	4.53	1.57	15,008	......	11.59
144	New River Co. (Summerlee) (Parral)	Sewell	7875	A. R.	2.51	21.94	72.99	2.56	0.49	.....	....	.....	....	14,926	......	.....
144	New River Co. (Summerlee) (Parral)	Sewell	7874	A. R.	3.40	20.47	73.09	3.04	0.52	.....	....	.....	....	14,657	......	.....
144	New River Co. (Summerlee) (Parral)	Sewell	8084	A. R.	1.98	20.96	73.79	3.27	0.53	.....	....	.....	....	......	......	.....
144	New River Co. (Summerlee) (Parral)	Sewell	8967	A. R.	2.70	22.00	72.80	2.50	0.45	.....	....	.....	....	14,910	......	.....
144	New River Co. (Summerlee) (Parral)	Sewell	8161	A. R.	2.59	21.19	73.17	3.05	0.57	83.71	5.13	5.97	1.57	14,778	14,915	9.18

Table 3—Coal Analyses by U. S. Geological Survey and U. S. Bureau of Mines—(Continued).

No. on Map II	Mine	Coal Bed.	Laboratory Number.	Condition of Sample.	Proximate			Common to both.		Ultimate				Calorimeter B. T. U. for 1 lb. of Coal	Calculated B. T. U. for 1 lb. of Coal	Carbon Divided by Oxygen + Ash
					Moisture	Volatile Matter	Fixed Carbon	Ash	Sulphur	Carbon	Hydrogen	Oxygen	Nitrogen			
148	New River Co. (Summerlee) ([illegible])	Sewell	8151	A. D.	0.80	21.58	74.51	3.11	0.58	85.24	5.02	4.45	1.60	15,050	......	11.28
149	Dunglen Coal Co. (Sewell Knob)	Sewell	7994	A. R.	3.05	19.74	74.57	2.64	0.79	.....	....	.....	....	......	......	.....
149	Dunglen Coal Co. (Sewell Knob)	Sewell	8221	A. R.	3.01	20.07	74.31	2.61	0.96	.....	....	.....	....	......	......	.....
149	Dunglen Coal Co. (Sewell Knob)	Sewell	8220	A. R.	3.49	19.17	75.01	2.33	0.52	.....	....	.....	....	......	......	.....
149	Dunglen Coal Co. (Sewell Knob)	Sewell	8295	A. R.	3.23	19.32	74.83	2.62	0.75	83.90	5.22	6.05	1.46	14,785	14,999	9.68
149	Dunglen Coal Co. (Sewell Knob)	Sewell	8295	A. D.	0.85	19.80	76.67	2.68	0.77	85.96	5.07	4.02	1.50	15,149	......	12.83
151	Prudence Coal Co. (Prudence)	Sewell	7915	A. R.	3.85	19.40	71.79	4.96	0.63	.....	....	.....	....	14,240	......	.....
151	Prudence Coal Co. (Prudence)	Sewell	7916	A. R.	4.47	20.59	69.54	5.40	0.86	.....	....	.....	....	14,031	......	.....
151	Prudence Coal Co. (Prudence)	Sewell	8218	A. R.	4.08	19.01	72.61	4.30	0.53	.....	....	.....	....	......	......	.....
151	Prudence Coal Co. (Prudence)	Sewell	8219	A. R.	3.18	20.01	71.76	5.05	1.35	.....	....	.....	....	......	......	.....
151	Prudence Coal Co. (Prudence)	Sewell	8301	A. R.	3.85	19.08	72.05	5.02	0.84	80.72	5.11	6.89	1.42	14,256	14,411	6.78
151	Prudence Coal Co. (Prudence)	Sewell	8301	A. D.	1.08	19.63	74.13	5.16	0.86	83.05	4.94	4.53	1.46	14,666	......	8.57
152	Harvey C. & C. Co. (Harvey)	Sewell	7920	A. R.	2.82	21.32	71.86	4.00	2.08	.....	....	.....	....	14,591	......	.....
152	Harvey C. & C. Co. (Harvey)	Sewell	7921	A. R.	2.94	19.97	74.77	2.32	0.57	.....	....	.....	....	14,751	......	.....
152	Harvey C. & C. Co. (Harvey)	Sewell	8085	A. R.	2.86	19.96	72.30	4.88	0.61	.....	....	.....	....	......	......	.....
152	Harvey C. & C. Co. (Harvey)	Sewell	8164	A. R.	2.94	20.11	73.10	3.85	1.12	82.60	5.04	5.93	1.46	14,582	14,726	8.45
152	Harvey C. & C. Co. (Harvey)	Sewell	8164	A. D.	0.86	20.54	74.67	3.93	1.14	84.37	4.91	4.16	1.49	14,895	......	10.43
153	Star C. & C. Co. (Star)	Sewell	5396	A. R.	2.79	18.82	75.46	2.93	0.70	.....	....	.....	....	14,954	......	.....
153	Star C. & C. Co. (Star)	Sewell	5397	A. R.	2.27	20.52	71.75	5.46	0.60	.....	....	.....	....	14,663	......	.....
153	Star C. & C. Co. (Star)	Sewell	5489	A. R.	2.09	19.39	74.63	3.89	0.89	79.61	4.88	9.40	1.33	14,783	......	5.99
153	Star C. & C. Co. (Star)	Sewell	5574	A. R.	2.36	18.76	73.74	5.14	0.76	82.53	4.88	5.29	1.40	14,596	......	7.91
153	Star C. & C. Co. (Star)	Sewell	7988	A. R.	2.71	17.87	76.22	3.20	0.59	.....	....	.....	....	......	......	.....
153	Star C. & C. Co. (Star)	Sewell	7991	A. R.	2.46	19.97	75.17	2.40	0.63	.....	....	.....	....	......	......	.....
153	Star C. & C. Co. (Star)	Sewell	8656	A. R.	2.80	17.50	77.10	2.60	0.55	.....	....	.....	....	14,880	......	.....
153	Star C. & C. Co. (Star)	Sewell	8657	A. R.	2.40	19.00	74.20	4.40	1.15	.....	....	.....	....	14,590	......	.....
153	Star C. & C. Co. (Star)	Sewell	8296	A. R.	2.81	18.96	75.49	2.74	0.57	84.04	5.05	6.02	1.58	14,801	14,913	9.59
153	Star C. & C. Co. (Star)	Sewell	8296	A. D.	0.83	19.35	77.02	2.80	0.58	85.76	4.93	4.32	1.61	15,104	......	12.04
154	Laura Mining Co. (Laura)	Sewell	8001*	A. R.	9.28	15.98	68.95	5.79	1.19	.....	....	.....	....	......	......	.....
154	Laura Mining Co. (Laura)	Sewell	8002	A. R.	3.15	18.77	73.41	4.67	0.81	.....	....	.....	....	......	......	.....
154	Laura Mining Co. (Laura)	Sewell	8003	A. R.	2.59	18.62	74.93	3.86	0.67	.....	....	.....	....	......	......	.....
154	Laura Mining Co. (Laura)	Sewell	8118	A. R.	5.24	16.84	73.20	4.72	0.86	80.64	5.06	7.38	1.34	14,112	14,332	10.56
154	Laura Mining Co. (Laura)	Sewell	8118	A. D.	0.77	17.63	76.66	4.94	0.90	84.41	4.77	3.55	1.40	14,776	......	9.95
155	New River Co. (Collins)	Sewell	7923	A. R.	3.83	19.03	71.20	5.94	0.75	.....	....	.....	....	14,090	......	.....
155	New River Co. (Collins)	Sewell	7922	A. R.	3.75	17.01	75.00	4.24	0.68	.....	....	.....	....	15,617	......	.....
155	New River Co. (Collins)	Sewell	8124	A. R.	2.71	17.45	76.73	3.11	1.59	.....	....	.....	....	......	......	.....
155	New River Co. (Collins)	Sewell	8125	A. R.	2.86	19.28	73.25	4.61	0.74	.....	....	.....	....	......	......	.....
155	New River Co. (Collins)	Sewell	8650	A. R.	3.70	16.00	75.20	5.10	1.15	.....	....	.....	....	14,310	......	.....
155	New River Co. (Collins)	Sewell	8651	A. R.	3.50	16.50	74.90	5.10	0.55	.....	....	.....	....	14,350	......	.....
155	New River Co. (Collins)	Sewell	8192	A. R.	3.21	17.87	74.42	4.50	0.97	82.10	5.08	5.80	1.55	14,540	......	7.97

Table 3—Coal Analyses by U. S. Geological Su rvey and U. S. Bureau of Mines—(Continued).

No. on Map II.	Mine.	Coal Bed.	Laboratory Number.	Condition of Sample.	Proximate			Common to both.		Ultimate				Calorimeter B. T. U. for 1 lb. of Coal	Calculated B. T. U. for 1 lb. of Coal	Carbon Divided by Oxygen + Ash
					Moisture	Volatile Matter	Fixed Carbon	Ash	Sulphur	Carbon	Hydrogen	Oxygen	Nitrogen			
155A	Nichol Colliery Co.	Sewell	8000	A. R.	2.57	18.00	75.50	3.93	0.51	.....	....	.....	....	......	......	.....
155A	Nichol Colliery Co.	Sewell	8004	A. R.	2.45	18.92	75.80	2.83	0.55	.....	....	.....	....	......	......	.....
155A	Nichol Colliery Co.	Sewell	8022	A. R.	2.57	16.92	76.24	4.27	0.86	.....	....	.....	....	......	......	.....
155A	Nichol Colliery Co.	Sewell	8595	A. R.	2.70	19.00	75.40	2.90	0.55	.....	....	.....	....	14,830	......	.....
155A	Nichol Colliery Co.	Sewell	8596	A. R.	2.80	18.50	74.70	4.00	0.75	.....	....	.....	....	14,590	......	.....
155A	Nichol Colliery Co.	Sewell	8110	A. R.	2.77	18.87	74.83	3.53	0.64	83.95	4.84	5.48	1.56	14,735	......	9.32
156	White Oak Fuel Co. (Wingrove)	Sewell	7906	A. R.	5.86	18.82	70.76	4.56	0.80	.....	....	.....	....	14 006	......	.....
156	White Oak Fuel Co. (Wingrove)	Sewell	7907	A. R.	6.43	17.78	70.80	4.99	0.77	.....	....	.....	....	13,826	......	.....
156	White Oak Fuel Co. (Wingrove)	Sewell	8126	A. R.	2.68	17.71	76.42	3.19	0.60	.....	....	.....	....	......	......	.....
156	White Oak Fuel Co. (Wingrove)	Sewell	8597	A. R.	2.20	19.50	70.80	7.50	1.45	.....	....	.....	....	14,140	......	.....
156	White Oak Fuel Co. (Wingrove)	Sewell	8183	A. R.	5.13	17.77	72.77	4.33	0.72	80.58	5.01	7.84	1.52	14,258	14,249	6.22
156	White Oak Fuel Co. (Wingrove)	Sewell	8183	A. D.	1.07	18.53	75.89	4.51	0.75	84.03	4.74	4.39	1.58	14,868	......	9.14
157	New River Co. (Whipple)	Sewell	7889	A. R.	2.41	20.58	71.64	5.37	1.06	.....	....	.....	....	14,332	......	.....
157	New River Co. (Whipple)	Sewell	7890	A. R.	2.51	19.67	71.32	6.50	0.92	.....	....	.....	....	14,191	......	.....
157	New River Co. (Whipple)	Sewell	8098	A. R.	2.98	19.19	74.84	2.99	1.05	.....	....	.....	....	......	......	.....
157	New River Co. (Whipple)	Sewell	8599	A. R.	2.70	20.50	72.80	4.00	0.60	.....	....	.....	....	14,660	......	.....
157	New River Co. (Whipple)	Sewell	8157	A. R.	2.67	20.06	72.09	5.18	1.02	82.32	4.78	5.23	1.47	14,438	14,576	7.91
157	New River Co. (Whipple)	Sewell	8157	A. D.	1.09	20.39	73.26	5.26	1.04	83.66	4.67	3.88	1.49	14,672	......	9.15
158	White Oak Fuel Co. (Carlisle)	Sewell	7880	A. R.	3.73	18.83	75.70	1.74	0.56	.....	....	.....	....	14,884	......	.....
158	White Oak Fuel Co. (Carlisle)	Sewell	7881	A. R.	2.94	19.25	73.81	4.00	1.34	.....	....	.....	....	14,578	......	.....
158	White Oak Fuel Co. (Carlisle)	Sewell	8080	A. R.	2.65	20.61	72.61	4.13	0.91	.....	....	.....	....	......	......	.....
158	White Oak Fuel Co. (Carlisle)	Sewell	8166	A. R.	3.16	19.34	74.06	3.44	0.93	83.40	4.93	5.83	1.47	14,663	14,773	9.00
158	White Oak Fuel Co. (Carlisle)	Sewell	8166	A. D.	0.88	19.80	75.80	3.52	0.95	85.36	4.78	3.89	1.50	15,008	......	11.52
158	White Oak Fuel Co. (Carlisle)	Sewell	8702	A. R.	2.90	17.50	76.60	3.00	0.80	.....	....	.....	....	14 810	......	.....
158	White Oak Fuel Co (Carlisle)	Sewell	8703	A. R.	3.50	16.50	77.20	2.80	0.45	.....	....	.....	....	14,770	......	.....
159	White Oak Fuel Co. (Oakwood)	Sewell	7876	A. R.	4.96	18.34	73.83	2.87	0.63	.....	....	.....	....	14,423	......	.....
159	White Oak Fuel Co. (Oakwood)	Sewell	7877	A. R.	4.57	18.19	74.04	3.20	0.76	.....	....	.....	....	14,456	......	.....
159	White Oak Fuel Co. (Oakwood)	Sewell	8251	A. R.	4.95	18.16	73.75	3.14	0.82	82.15	5.09	7.32	1.48	14,434	......	7.85
159	White Oak Fuel Co. (Oakwood)	Sewell	8171	A. R.	2.60	18.75	76.47	2.18	0.58	.....	....	.....	....	14,938	......	.....
159	White Oak Fuel Co. (Oakwood)	Sewell	8606	A. R.	2.67	19.95	75.03	2.35	0.54	.....	....	.....	....	14,945	......	.....
160	White Oak Fuel Co. (Scarbro)	Sewell	7895	A R.	4.19	17.83	74.31	3.67	0.66	.....	....	.....	....	14,398	......	.....
160	White Oak Fuel Co. (Scarbro)	Sewell	7896	A. R.	4.73	20.25	69.34	5.68	1.52	.....	....	.....	....	13,975	......	.....
160	White Oak Fuel Co. (Scarbro)	Sewell	8128	A. R.	2.51	20.26	74.88	2.35	0.68	.....	....	.....	....	......	......	.....
160	White Oak Fuel Co. (Scarbro)	Sewell	8187	A. R.	3.89	19.16	72.97	3.98	0.90	81.59	4.97	7.15	1.41	14 371	14,434	7.33
160	White Oak Fuel Co. (Scarbro)	Sewell	8187	A. D.	0.92	19.75	75.23	4.10	0.93	84.11	4.78	4.63	1.45	14,816	......	9.63
161	New River Colliery Co. (Sun No. 1)	Sewell	1197	A. R.	2.48	21.28	72.09	4.15	1.08	.....	....	.....	....	......	......	.....
161	New River Colliery Co. (Sun No. 1)	Sewell	1197	A. D.	0.80	21.65	73.33	4.22	1.10	.....	....	.....	....	......	......	.....
161	New River Colliery Co. (Sun No. 1)	Sewell	1198	A. R.	2.12	21.74	72.59	3.55	0.90	.....	....	.....	....	14,915	......	.....

Table 3—Coal Analyses by U. S. Geological Survey and U. S. Bureau of Mines—(Continued).

Index Map II	Mine	Coal Bed	Laboratory Number	Condition of Sample	Proximate			Common to both		Ultimate				Calorimeter B. T. U. per 1 lb of Coal	Calculated B. T. U. per 1 lb. of Coal	Carbon Divided by (Oxygen + Ash)
					Moisture	Volatile Matter	Fixed Carbon	Ash	Sulphur	Carbon	Hydrogen	Oxygen	Nitrogen			
161	New River Colliery Co. (Sun No. 1)	Sewell	1198	A. D.	0.63	22.07	73.70	3.60	0.91	....	....	....	....	15,142	....	....
161	New River Colliery Co. (Sun No. 1)	Sewell	1595	A. R.	3.94	19.88	71.25	4.93	1.16	79.78	4.60	8.52	1.01	14,382	14,838	5.93
161	New River Colliery Co. (Sun No. 1)	Sewell	1595	A. D.	0.76	20.54	73.61	5.09	1.20	82.41	4.38	5.87	1.05	14,851	14,296	7.52
161	New River Colliery Co. (Sun No. 1)	Sewell	1609	A. R.	2.57	20.22	68.27	8.94	1.13	....	....	....	....	....	....	....
161	New River Colliery Co. (Sun No. 1)	Sewell	1609	A. D.	0.28	20.69	69.87	9.16	1.16	....	....	....	....	....	....	....
161	New River Colliery Co. (Sun No. 1)	Sewell	8099	A. R.	2.32	17.60	76.01	4.07	0.87	....	....	....	....	....	....	....
161	New River Colliery Co. (Sun No. 1)	Sewell	8206	A. R.	3.03	18.00	73.69	5.28	1.51	....	....	....	....	....	....	....
161	New River Colliery Co. (Sun No. 1)	Sewell	8207	A. R.	2.04	18.97	72.47	6.52	1.75	....	....	....	....	....	....	....
161	New River Colliery Co. (Sun No. 1)	Sewell	8208	A. R.	1.51	19.46	74.08	4.95	2.16	....	....	....	....	....	....	....
161	New River Colliery Co. (Sun No. 1)	Sewell	8209	A. R.	2.59	16.91	74.69	5.81	0.81	....	....	....	....	....	....	....
161	New River Colliery Co. (Sun No. 1)	Sewell	8210	A. R.	3.08	16.55	75.87	4.50	0.58	....	....	....	....	....	....	....
161	New River Colliery Co. (Sun No. 1)	Sewell	8291	A. R.	2.57	18.15	74.16	5.12	1.26	82.68	4.87	4.69	1.38	14,513	14,731	8.43
161	New River Colliery Co. (Sun No. 1)	Sewell	8291	A. D.	0.89	18.46	75.44	5.21	1.28	84.11	4.76	3.24	1.40	14,761	....	9.95
161	New River Colliery Co. (Sun No. 1)	Sewell	9614	A. R.	6.64	18.73	69.44	5.19	1.93	78.11	4.94	8.39	1.44	13,806	....	5.75
161	New River Colliery Co. (Sun No. 1)	Sewell	9615	A. R.	2.94	19.69	68.67	8.70	1.80	77.66	4.79	5.63	1.45	13,786	....	5.13
161	New River Colliery Co. (Sun No. 1)	Sewell	51*	A. R.	3.36	....	....	3.45	0.62	....	....	....	....	14,618	....	....
161	New River Colliery Co. (Sun No. 1)	Sewell	52*	A. R.	3.80	....	....	3.85	0.85	....	....	....	....	14,488	....	....
161	New River Colliery Co. (Sun No. 1)	Sewell	50*	A. R.	3.21	....	....	2.83	0.44	....	....	....	....	14,751	....	....
161	New River Colliery Co. (Sun No. 1)	Sewell	127*	A. R.	3.49	....	....	3.38	0.77	83.15	4.94	6.40	1.40	14,614	....	8.50
161	New River Colliery Co. (Sun No. 1)	Sewell	1401	A. D.	0.90	20.60	69.52	8.98	1.55	....	....	....	....	....	....	....
161	New River Colliery Co. (Sun No. 1)	Sewell	1401	A. R.	2.68	20.23	68.27	8.82	1.52	....	....	....	....	....	....	....
161	New River Colliery Co. (Sun No. 1)	Sewell	1607	A. D.	0.30	21.78	71.06	6.86	0.95	....	....	....	....	....	....	....
161	New River Colliery Co. (Sun No. 1)	Sewell	1607	A. R.	2.99	21.19	69.15	6.67	0.92	....	....	....	....	....	....	....
161	New River Colliery Co. (Sun No. 1)	Sewell	1398	A. D.	1.18	21.12	72.54	5.16	1.39	....	....	....	....	....	....	....
161	New River Colliery Co. (Sun No. 1)	Sewell	1398	A. R.	3.85	20.55	70.58	5.02	1.36	....	....	....	....	....	....	....
163	McKell C. & C. Co. (Derryhale)	Sewell	8005	A. R.	2.63	19.52	73.56	4.29	1.35	....	....	....	....	....	....	....
163	McKell C. & C. Co. (Derryhale)	Sewell	8006	A. R.	3.14	18.02	74.98	3.86	0.73	....	....	....	....	....	....	....
163	McKell C. & C. Co. (Derryhale)	Sewell	8023	A. R.	3.70	17.05	76.68	2.57	0.59	....	....	....	....	....	....	....
163	McKell C. & C. Co. (Derryhale)	Sewell	8113	A. R.	3.33	17.34	75.68	3.65	0.83	83.17	4.92	5.93	1.50	14,593	14,722	8.68
163	McKell C. & C. Co. (Derryhale)	Sewell	8113	A. D.	0.75	17.80	77.70	3.75	0.85	85.39	4.75	3.72	1.54	14,981	....	11.13
163	McKell C. & C. Co. (Derryhale)	Sewell	5404	A. R.	3.71	18.47	75.05	2.77	0.47	....	....	....	....	14,794	....	....
163	McKell C. & C. Co. (Derryhale)	Sewell	5431	A. R.	3.26	19.52	74.55	2.67	0.59	....	....	....	....	14,960	....	....
163	McKell C. & C. Co. (Derryhale)	Sewell	5501	A. R.	2.06	17.57	74.10	6.33	0.91	81.37	4.75	5.36	1.28	14,465	....	6.96
163	McKell C. & C. Co. (Derryhale)	Sewell	5561	A. R.	2.61	16.41	75.26	5.72	0.90	81.84	4.63	5.36	1.55	14,530	....	7.38
165	New River C. & C. Co. (No. 2)	Sewell	7984	A. R.	2.68	16.81	77.17	3.34	0.18	....	....	....	....	14,670	....	....
165	New River C. & C. Co. (No. 2)	Sewell	7985	A. R.	3.69	17.24	76.13	2.94	0.69	83.51	5.19	6.18	1.49	14,580	....	9.16
165	New River C. & C. Co. (No. 2)	Sewell	8603	A. R.	3.60	16.00	78.00	2.40	0.55	....	....	....	....	....	....	....

*Not included in average of Proximate Analyses.

Table 3—Coal Analyses by U. S. Geological Survey and U. S. Bureau of Mines—(Continued).

No. on Map II.	Mine.	Coal Bed.	Laboratory Number	Condition of Sample.	Proximate			Common to Both		Ultimate				Calorimeter B. T. U. for 1 Lb. of Coal	Calculated B. T. U. for 1 Lb. of Coal	Carbon divided by Oxygen — ash.
					Moisture	Volatile Matter	Fixed Carbon	Ash	Sulphur	Carbon	Hydrogen	Oxygen	Nitrogen			
165	New River C. & C. Co. (No. 2)	Sewell	8604	A. R.	3.70	16.00	76.20	4.10	0.55	.....	....	.....	....	......	......	.....
165	New River C. & C. Co. (No. 2)	Sewell	8605	A. R.	3.40	16.00	77.00	3.60	0.85	.....	....	.....	....	......	......	.....
165	New River C. & C. Co. (No. 2)	Sewell	8744	A. R.	3.40	15.50	77.62	3.48	0.70	83.01	4.80	6.54	1.47	14,630	......	8.20
165	New River C. & C. Co. (No. 2)	Sewell	14383	A. R.	3.75	22.11	71.95	2.19	0.58	.....	....	.....	....	......	......	.....
165	New River C. & C. Co. (No. 2)	Sewell	14384	A. R.	3.62	21.01	72.16	3.21	0.80	.....	....	.....	....	......	......	.....
165	New River C. & C. Co. (No. 2)	Sewell	14385	A. R.	3.31	21.33	72.87	2.49	0.41	.....	....	.....	....	......	......	.....
165	New River C. & C. Co. (No. 2)	Sewell	14386	A. A.	3.58	21.07	72.75	2.60	0.64	84.38	5.01	5.72	1.65	14,751	......	10.14
165	New River C. & C. Co. (No. 2)	Sewell	14387	A. R.	3.95	20.61	72.94	2.50	0.53	.....	....	.....	....	......	......	.....
165	New River C. & C. Co. (No. 2)	Sewell	14388	A. R.	3.54	20.45	73.02	2.99	0.55	.....	....	.....	....	......	......	.....
165	New River C. & C. Co. (No. 2)	Sewell	14389	A. R.	3.77	21.00	72.46	2.77	0.55	84.06	4.91	6.05	1.66	14,683	......	9.53
167	Turkey Knob C. & C. Co. (Turkey Knob)	Sewell	8035	A. R.	3.34	18.07	75.82	2.77	0.51	.....	....	.....	....	......	......	.....
167	Turkey Knob C. & C. Co. (Turkey Knob)	Sewell	8036	A. R.	3.31	18.43	76.10	2.16	0.56	.....	....	.....	....	......	......	.....
167	Turkey Knob C. & C. Co. (Turkey Knob)	Sewell	8048	A. R.	2.79	18.93	74.59	3.69	1.61	.....	....	.....	....	......	......	.....
167	Turkey Knob C. & C. Co. (Turkey Knob)	Sewell	8047	A. R.	3.01	16.95	77.40	2.64	0.51	.....	....	.....	....	......	......	.....
167	Turkey Knob C. & C. Co. (Turkey Knob)	Sewell	8103	A. R.	3.22	19.22	74.82	2.74	0.77	84.42	4.93	5.73	1.41	14,816	14,922	9.99
167	Turkey Knob C. & C. Co. (Turkey Knob)	Sewell	8103	A. D.	0.74	19.71	76.74	2.81	0.79	86.58	4.77	3.60	1.45	15,196	......	13.51
168	New River C. & C. Co. (Macdonald)	Sewell	2359	A. R.	3.26	21.57	72.71	2.16	0.78	.....	....	.....	....	14,773	......	.....
168	New River C. & C. Co. (Macdonald)	Sewell	2360	A. R.	3.51	21.11	72.83	2.55	0.53	.....	....	.....	....	......	......	.....
168	New River C. & C. Co. (Macdonald)	Sewell	2549	A. R.	2.96	22.74	69.29	5.01	0.89	81.64	4.84	6.08	1.57	14,125	......	7.36
168	New River C. & C. Co. (Macdonald)	Sewell	7987	A. R.	3.32	18.96	75.17	2.55	0.72	.....	....	.....	....	......	......	.....
168	New River C. & C. Co. (Macdonald)	Sewell	7993	A. R.	2.98	18.22	76.18	2.62	0.58	.....	....	.....	....	......	......	.....
168	New River C. & C. Co. (Macdonald)	Sewell	7999	A. R.	3.02	17.52	76.31	3.15	0.60	.....	....	.....	....	......	......	.....
168	New River C. & C. Co. (Macdonald)	Sewell	8112	A. R.	3.22	17.53	76.46	2.79	0.64	84.11	5.01	5.89	1.56	14,760	......	9.69
169	Sugar Creek C. & C. Co. (Sugar Creek)	Sewell	7986	A. R.	2.45	19.12	75.14	3.29	0.64	.....	....	.....	....	......	......	.....
169	Sugar Creek C. & C. Co. (Sugar Creek)	Sewell	7996	A. R.	4.09	18.10	74.77	3.04	0.77	.....	....	.....	....	......	......	.....
169	Sugar Creek C. & C. Co. (Sugar Creek)	Sewell	7997	A. R.	5.50	16.57	74.38	3.55	0.85	.....	....	.....	....	......	......	.....
169	Sugar Creek C. & C. Co. (Sugar Creek)	Sewell	8598	A. R.	4.40	18.50	72.80	4.30	0.70	.....	....	.....	....	14,300	......	.....
169	Sugar Creek C. & C. Co. (Sugar Creek)	Sewell	8105	A. R.	4.04	18.22	74.43	3.31	0.81	82.92	5.00	6.68	1.28	14,470	14,674	8.30
169	Sugar Creek C. & C. Co. (Sugar Creek)	Sewell	8105	A. D.	0.66	18.86	77.05	3.43	0.84	85.84	4.78	3.78	1.33	14,980	......	11.91
172	McKell C. & C. Co. (Kilsyth)	Sewell	8058	A. R.	3.40	18.00	74.03	4.57	0.76	.....	....	.....	....	......	......	.....
172	McKell C. & C. Co. (Kilsyth)	Sewell	8090	A. R.	3.20	15.51	76.83	4.46	0.56	.....	....	.....	....	......	......	.....
172	McKell C. & C. Co. (Kilsyth)	Sewell	8095	A. R.	2.61	17.27	76.39	3.73	0.88	.....	....	.....	....	......	......	.....
172	McKell C. & C. Co. (Kilsyth)	Sewell	8091	A. R.	2.95	17.11	76.58	3.36	0.58	.....	....	.....	....	......	......	.....
172	McKell C. & C. Co. (Kilsyth)	Sewell	8089	A. R.	2.68	17.41	74.13	5.78	1.92	.....	....	.....	....	......	......	.....
172	McKell C. & C. Co. (Kilsyth)	Sewell	8163	A. R.	2.86	17.63	75.16	4.35	0.91	83.36	4.89	4.91	1.55	14,539	14,818	9.00
172	McKell C. & C. Co. (Kilsyth)	Sewell	8163	A. D.	0.67	18.03	76.85	4.45	0.96	85.24	4.75	3.02	1.58	14,866	......	11.41
173	White Oak Fuel Co. (Sherwood)	Sewell	7989	A. R.	2.15	18.43	75.88	3.54	1.01	.....	....	.....	....	......	......	.....
173	White Oak Fuel Co. (Sherwood)	Sewell	7990	A. R.	2.86	18.46	76.23	2.45	0.78	.....	....	.....	....	......	......	.....

Table 3—Coal Analyses by U. S. Geological Survey and U. S. Bureau of Mines—(Continued).

Map No.	Mine	Coal Bed	Laboratory Number	Condition of Sample	Proximate			Common to Both		Ultimate				Calorimeter B. T. U. for 1 Lb. of Coal	Calculated B. T. U. for 1 Lb. of Coal	[illegible]
					Moisture	Volatile Matter	Fixed Carbon	Ash	Sulphur	Carbon	Hydrogen	Oxygen	Nitrogen			
177	White Oak Fuel Co. (Sherwood)	Sewell	8292	A. R.	2.58	19.01	75.53	2.88	0.90	84.15	5.10	5.22	1.45	14,877	15,079	10.19
177	White Oak Fuel Co. (Sherwood)	Sewell	8292	A. D.	0.79	19.36	76.92	2.93	0.92	86.00	4.99	3.68	1.48	15,149	......	13.01
	Average	Sewell	......	A. D.	0.85	20.81	74.21	4.13	0.91	84.86	4.86	4.33	1.61	14,952	......	10.61
	Average	Sewell	......	A. R.	3.29	20.86	72.31	3.54	1.15	82.22	5.01	6.59	1.49	14,574	14,680	8.16
187	Scotia Coal Co. (Red Ash)	Fire Creek	8070	A. R.	2.45	18.68	75.28	3.59	0.58	......	.....	......	.....	......	......	.....
187	Scotia Coal Co. (Red Ash)	Fire Creek	8071	A. R.	4.36	16.42	74.94	4.28	0.52	......	.....	......	.....	......	......	.....
187	Scotia Coal Co. (Red Ash)	Fire Creek	8072	A. R.	3.19	17.45	70.84	8.52	0.72	......	.....	......	.....	......	......	.....
187	Scotia Coal Co. (Red Ash)	Fire Creek	8108	A. R.	3.29	17.85	73.39	5.47	0.59	81.36	4.87	6.25	1.46	14,276	14,395	6.94
187	Scotia Coal Co. (Red Ash)	Fire Creek	8108	A. D.	0.81	18.31	75.27	5.61	0.60	83.45	4.71	4.13	1.50	14,641	......	8.57
188	Scotia Coal Co. (Rush Run)	Fire Creek	1175	A. D.	0.80	23.00	70.23	5.97	0.75	......	.....	......	.....	......	......	.....
188	Scotia Coal Co. (Rush Run)	Fire Creek	1175	A. R.	2.29	22.65	69.18	5.88	0.73	......	.....	......	.....	......	......	.....
188	Scotia Coal Co. (Rush Run)	Fire Creek	1176	A. D.	0.51	23.04	72.85	3.60	0.76	......	.....	......	.....	......	......	.....
188	Scotia Coal Co. (Rush Run)	Fire Creek	1176	A. R.	2.10	22.67	71.68	3.55	0.75	......	.....	......	.....	14,900	......	.....
188	Scotia Coal Co. (Rush Run)	Fire Creek	1390	A. D.	0.64	21.74	72.53	5.09	0.66	83.62	4.70	4.23	1.70	14,942	14,771	8.97
188	Scotia Coal Co. (Rush Run)	Fire Creek	1390	A. R.	1.53	21.54	71.88	5.05	0.65	82.87	4.76	4.99	1.68	14,807	14,644	8.75
188	Scotia Coal Co. (Rush Run)	Fire Creek	5327	A. R.	3.35	18.65	73.69	4.31	0.51	......	.....	......	.....	14,827	......	.....
188	Scotia Coal Co. (Rush Run)	Fire Creek	5328	A. R.	2.97	18.96	74.60	3.47	0.60	......	.....	......	.....	14,978	......	.....
188	Scotia Coal Co. (Rush Run)	Fire Creek	5436	A. R.	2.04	18.96	71.75	7.25	[illegible]	80.83	4.80	4.88	1.19	14,254	......	6.51
188	Scotia Coal Co. (Rush Run)	Fire Creek	5438	A. R.	2.05	18.63	73.52	5.80	0.57	81.58	4.86	5.76	1.43	14,419	......	7.06
188	Scotia Coal Co. (Rush Run)	Fire Creek	8096	A. R.	2.80	17.94	74.33	4.93	0.75	......	.....	......	.....	......	......	.....
188	Scotia Coal Co. (Rush Run)	Fire Creek	8097	A. R.	2.80	18.86	73.83	4.51	0.91	......	.....	......	.....	......	......	.....
188	Scotia Coal Co. (Rush Run)	Fire Creek	8100	A. R.	2.64	18.80	74.31	4.25	0.72	......	.....	......	.....	......	......	.....
188	Scotia Coal Co. (Rush Run)	Fire Creek	8160	A. R.	2.68	19.05	73.79	4.48	0.68	82.78	5.04	5.42	1.60	14,470	14,771	8.36
188	Scotia Coal Co. (Rush Run)	Fire Creek	8160	A. D.	0.80	19.42	75.21	4.57	0.69	84.38	4.92	3.81	1.63	14,751	......	10.97
191	New River & Poca. Cons. Coal Co. (No. 1)	Fire Creek	8240	A. R.	2.79	16.64	75.22	5.35	0.60	......	.....	......	.....	......	......	.....
191	New River & Poca. Cons. Coal Co. (No. 1)	Fire Creek	8241	A. R.	2.94	18.06	73.10	5.90	0.58	......	.....	......	.....	......	......	.....
191	New River & Poca. Cons. Coal Co. (No. 1)	Fire Creek	8300	A. R.	3.05	17.32	74.00	5.63	0.57	81.56	4.97	5.70	1.57	14,122	14,528	7.20
191	New River & Poca. Cons. Coal Co. (No. 1)	Fire Creek	8300	A. D.	0.87	17.71	75.66	5.76	0.58	83.39	4.84	3.82	1.61	14,716	......	9.72
192	Newlyn Coal Co.	Fire Creek	8600	A. R.	3.30	18.50	76.00	2.20	0.60	......	.....	......	.....	14,960	......	.....
196	Beury Bros. C. & C. Co. (Echo)	Fire Creek	8249	A. R.	3.20	16.46	75.14	5.20	0.51	81.83	4.93	6.04	1.49	14,368	......	7.28
196	Beury Bros. C. & C. Co. (Echo)	Fire Creek	8243	A. R.	3.43	16.87	75.22	4.48	0.56	81.95	5.14	6.42	1.45	14,369	......	7.52
196	Beury Bros. C. & C. Co. (Echo)	Fire Creek	8289	A. R.	3.30	16.50	75.30	4.85	0.56	82.16	4.90	5.96	1.57	14,160	......	7.60
198	Stone Cliff C. & C. Co.	Fire Creek	7995	A. R.	2.80	17.69	74.02	5.49	0.41	......	.....	......	.....	......	......	.....
198	Stone Cliff C. & C. Co.	Fire Creek	7998	A. R.	2.44	19.03	72.11	6.42	0.50	......	.....	......	.....	......	......	.....
198	Stone Cliff C. & C. Co.	Fire Creek	8250	A. R.	2.63	17.81	73.48	6.08	0.46	82.08	4.84	5.22	1.32	14,281	14,555	7.26
198	Stone Cliff C. & C. Co.	Fire Creek	8250	A. D.	0.74	18.15	74.91	6.20	0.47	83.67	4.72	3.59	1.35	14,558	......	8.55
199	Beechwood C. & C. Co. (No. 2)	Fire Creek	8059	A. R.	2.87	17.02	75.93	4.18	0.52	......	.....	......	.....	......	......	.....
199	Beechwood C. & C. Co. (No. 2)	Fire Creek	8061	A. R.	3.97	15.91	75.31	4.81	0.55	......	.....	......	.....	......	......	.....
199	Beechwood C. & C. Co. (No. 2)	Fire Creek	8293	A. R.	3.46	16.37	75.59	4.58	0.54	82.71	4.96	5.77	1.44	14,513	14,681	7.99

Table 3—Coal Analyses by U. S. Geological Survey and U. S. Bureau of Mines—(Continued).

No. on Map II.	Mine.	Coal Bed.	Laboratory Number	Condition of Sample.	Proximate			Common to Both		Ultimate				Calorimeter B. T. U. for 1 Lb. of Coal	Calculated B. T. U. for 1 Lb. of Coal	Carbon divided by Oxygen + ash.
					Moisture	Volatile Matter	Fixed Carbon	Ash	Sulphur	Carbon	Hydrogen	Oxygen	Nitrogen			
199	Beechwood C. & C. Co. (No. 2)	Fire Creek	8293	A. D.	0.78	16.82	77.69	4.71	0.55	85.00	4.79	3.47	1.48	14,917	.....	10.39
200	Beechwood C. & C. Co. (No. 1)	Fire Creek	8060	A. R.	3.31	16.28	74.87	5.54	0.49	.....	....	.....	....	......	.....	.....
200	Beechwood C. & C. Co. (No. 1)	Fire Creek	8063	A. R.	3.19	17.87	73.50	5.44	0.52	.....	....	.....	....	......	.....	.....
200	Beechwood C. & C. Co. (No. 1)	Fire Creek	8062	A. R.	4.22	16.32	72.21	7.25	0.69	.....	....	.....	....	......	.....	.....
200	Beechwood C. & C. Co. (No. 1)	Fire Creek	8115	A. R.	3.54	17.03	73.28	6.15	0.51	80.93	4.83	6.19	1.39	14,099	14,310	6.56
200	Beechwood C. & C. Co. (No. 1)	Fire Creek	8115	A. D.	0.66	17.54	75.47	6.33	0.53	83.35	4.64	3.72	1.43	14,521	.....	8.29
201	Alaska C. & C. Co. (Alaska)	Fire Creek	8169	A. R.	3.08	15.81	76.31	4.80	0.54	.....	....	.....	....	......	.....	.....
201	Alaska C. & C. Co. (Alaska)	Fire Creek	8170	A. R.	3.14	16.75	75.22	4.89	0.54	.....	....	.....	....	......	.....	.....
201	Alaska C. & C. Co. (Alaska)	Fire Creek	8294	A. R.	3.07	16.83	75.24	4.86	0.50	82.15	5.01	6.07	1.41	14,519	.....	7.52
203	Ephraims Creek C. & C. Co.	Fire Creek	8167	A. R.	4.85	15.96	70.94	8.25	0.87	.....	....	.....	....	......	.....	.....
203	Ephraims Creek C. & C. Co.	Fire Creek	8174	A. R.	2.87	17.43	74.29	5.41	0.74	.....	....	.....	....	......	.....	.....
203	Ephraims Creek C. & C. Co.	Fire Creek	8175	A. R.	3.17	15.41	76.36	5.06	0.54	.....	....	.....	....	......	.....	.....
203	Ephraims Creek C. & C. Co.	Fire Creek	8199	A. R.	3.37	16.54	74.44	5.65	0.64	.....	....	.....	....	......	.....	.....
203	Ephraims Creek C. & C. Co.	Fire Creek	8213	A. R.	3.57	17.96	72.34	6.13	0.75	.....	....	.....	....	......	.....	.....
203	Ephraims Creek C. & C. Co.	Fire Creek	8290	A. R.	3.60	16.83	73.42	6.15	0.67	81.03	4.92	5.68	1.55	14,216	.....	6.77
203	Ephraims Creek C. & C. Co.	Fire Creek	10629	A. R.	3.17	18.46	70.86	7.51	1.07	79.07	4.84	5.95	1.56	13,995	.....	5.87
205	Stonewall C. & C. Co. (Terry)	Fire Creek	8353	A. R.	2.65	16.32	75.26	5.77	0.90	.....	....	.....	....	......	.....	.....
205	Stonewall C. & C. Co. (Terry)	Fire Creek	8354	A. R.	3.03	16.01	73.85	7.11	0.49	.....	....	.....	....	......	.....	.....
205	Stonewall C. & C. Co. (Terry)	Fire Creek	8355	A. R.	2.53	15.93	78.76	2.78	0.60	.....	....	.....	....	......	.....	.....
205	Stonewall C. & C. Co. (Terry)	Fire Creek	8423	A. R.	2.75	15.99	76.01	5.25	0.64	82.56	4.84	5.28	1.43	14,508	14,627	7.84
205	Stonewall C. & C. Co. (Terry)	Fire Creek	8423	A. D.	0.97	16.28	77.40	5.35	0.65	84.07	4.72	3.75	1.46	14,774	.....	9.24
209	Export Coal Co.	Fire Creek	8891	A. R.	3.70	16.50	75.70	4.10	0.55	.....	....	.....	....	14,450	.....	.....
209	Export Coal Co.	Fire Creek	8285	A. R.	3.00	15.50	78.70	2.80	0.45	.....	....	.....	....	......	.....	.....
209	Export Coal Co.	Fire Creek	8284	A. R.	3.00	15.50	79.30	2.20	0.65	.....	....	.....	....	......	.....	.....
209	Export Coal Co.	Fire Creek	8286	A. R.	2.80	15.00	77.50	4.70	0.65	.....	....	.....	....	14,550	.....	.....
210	Laurel Creek Coal Co. (Laurel Creek)	Fire Creek	8315	A. R.	2.80	16.50	78.21	2.49	0.59	85.24	5.10	5.15	1.43	14,970	.....	11.16
210	Laurel Creek Coal Co. (Laurel Creek)	Fire Creek	8073	A. R.	2.39	14.50	78.93	4.18	0.87	.....	....	.....	....	14,657	.....	.....
210	Laurel Creek Coal Co. (Laurel Creek)	Fire Creek	8074	A. R.	2.74	14.16	77.85	5.25	0.65	.....	....	.....	....	......	.....	.....
210	Laurel Creek Coal Co. (Laurel Creek)	Fire Creek	8075	A. R.	2.85	14.44	78.02	4.69	0.55	.....	....	.....	....	......	.....	.....
210	Laurel Creek Coal Co. (Laurel Creek)	Fire Creek	8892	A. R.	3.70	16.00	75.50	4.80	0.50	.....	....	.....	....	14,370	.....	.....
210	Laurel Creek Coal Co. (Laurel Creek)	Fire Creek	8119	A. R.	2.69	15.48	76.91	4.92	0.59	83.55	4.84	4.69	1.41	14,501	14,812	8.69
210	Laurel Creek Coal Co. (Laurel Creek)	Fire Creek	8119	A. D.	0.70	15.80	78.48	5.02	0.60	85.25	4.71	2.98	1.44	14,796	.....	10.66
211	Glendale Colliery Co.	Fire Creek	8176	A. R.	3.54	14.88	74.79	6.79	1.04	.....	....	.....	....	......	.....	.....
211	Glendale Colliery Co.	Fire Creek	8200	A. R.	2.93	14.89	75.61	6.57	0.80	.....	....	.....	....	......	.....	.....
211	Glendale Colliery Co.	Fire Creek	8410	A. R.	3.30	15.58	74.46	6.66	0.94	80.66	4.83	5.45	1.46	14,150	.....	6.66
213	Quinnimont C. & C. Co. (Big "Q")	Fire Creek	8197	A. R.	4.99	14.52	73.09	7.40	0.79	.....	....	.....	....	......	.....	....
213	Quinnimont C. & C. Co. (Big "Q")	Fire Creek	8214	A. R.	3.58	15.39	72.46	8.57	0.85	.....	....	.....	....	......	.....	.....
213	Quinnimont C. & C. Co. (Big "Q")	Fire Creek	8215	A. R.	3.31	14.70	73.50	8.49	0.85	.....	....	.....	....	......	.....	.....
213	Quinnimont C. & C. Co. (Big "Q")	Fire Creek	8299	A. R.	4.01	14.06	73.73	8.20	0.78	79.05	4.83	5.74	1.40	13,846	14,708	5.67

Table 3—Coal Analyses by U. S. Geological Survey and U. S. Bureau of Mines—(Concluded).

Map No.	Mine	Coal Bed	Laboratory Number	Condition of Sample	Proximate			Common to Both		Ultimate				Calorimeter B. T. U. for 1 lb. of Coal	Calculated B. T. U. for 1 lb. of Coal	Carbon-Hydrogen Ratio
					Moisture	Volatile Matter	Fixed Carbon	Ash	Sulphur	Carbon	Hydrogen	Oxygen	Nitrogen			
[illegible]	[illegible] C. & C. Co. ([illegible])	Fire Creek	8299	A. D.	0.73	14.54	76.25	8.48	0.81	81.70	4.61	2.96	1.45	14,317	......	7.18
[illegible]	Armstrong Coal Co. (Slater Creek)	Fire Creek	8168	A. R.	4.00	16.13	73.81	6.06	0.64	.....	....	.....	....	......	......	.....
[illegible]	Armstrong Coal Co. (Slater Creek)	Fire Creek	8198	A. R.	4.30	15.44	73.70	6.56	0.72	.....	....	.....	....	......	......	.....
[illegible]	Armstrong Coal Co. (Slater Creek)	Fire Creek	8177	A. R.	3.29	16.56	75.37	4.78	0.69	.....	....	.....	....	......	......	.....
[illegible]	Armstrong Coal Co. (Slater Creek)	Fire Creek	8212	A. R.	3.76	16.30	75.56	4.38	0.79	.....	....	.....	....	......	......	.....
[illegible]	Armstrong Coal Co. (Slater Creek)	Fire Creek	8407	A. R.	4.17	16.56	72.86	6.41	0.65	80.10	4.99	6.53	1.32	14,069	......	6.19
[illegible]	Armstrong Coal Co. (Slater Creek)	Fire Creek	8408	A. R.	3.51	16.73	75.16	4.60	0.59	82.64	4.99	5.86	1.32	14,445	......	7.21
[illegible]	Hemlock Hollow C. & C. Co. (Hemlock)	Fire Creek	8238	A. R.	4.35	15.32	75.04	5.29	0.64	81.30	5.08	6.26	1.43	14,339	14,517	7.04
[illegible]	Hemlock Hollow C. & C. Co. (Hemlock)	Fire Creek	8238	A. D.	0.88	15.88	77.76	5.48	0.66	84.25	4.86	3.27	1.48	14,859	......	9.63
[illegible]	Hemlock Hollow C. & C. Co. (Hemlock)	Fire Creek	8239	A. R.	3.19	15.12	75.70	5.99	0.88	.....	....	.....	....	14,283	......	.....
[illegible]	Hemlock Hollow C. & C. Co. (Hemlock)	Fire Creek	8351	A. R.	3.24	15.09	76.21	5.46	0.82	.....	....	.....	....	......	......	.....
[illegible]	Hemlock Hollow C. & C. Co. (Hemlock)	Fire Creek	8352	A. R.	3.35	15.23	75.80	5.62	0.95	.....	....	.....	....	......	......	.....
[illegible]	Hemlock Hollow C. & C. Co. (Hemlock)	Fire Creek	8893	A. R.	3.40	16.00	74.60	6.00	0.90	.....	....	.....	....	14,200	......	.....
[illegible]	Hemlock Hollow C. & C. Co. (Hemlock)	Fire Creek	8894	A. R.	3.80	16.50	71.40	8.30	0.80	.....	....	.....	....	13,800	......	.....
[illegible]	Hemlock Hollow C. & C. Co. (Hemlock)	Fire Creek	8421	A. R.	3.49	14.81	76.20	5.50	0.76	82.35	4.91	5.04	1.44	14,368	14,663	7.81
[illegible]	Hemlock Hollow C. & C. Co. (Hemlock)	Fire Creek	8421	A. D.	0.81	15.22	78.32	5.65	0.78	84.64	4.74	2.71	1.48	14,765	......	10.12
[illegible]	Hemlock Hollow C. & C. Co. (Hemlock)	Fire Creek	5419	A. R.	2.96	17.47	73.57	6.00	1.08	.....	....	.....	....	14,407	......	.....
[illegible]	Hemlock Hollow C. & C. Co. (Hemlock)	Fire Creek	5420	A. R.	3.79	16.44	73.40	6.37	0.76	.....	....	.....	....	14,258	......	.....
[illegible]	Hemlock Hollow C. & C. Co. (Hemlock)	Fire Creek	5575	A. R	2.80	17.10	74.80	5.30	0.86	82.68	4.97	4.79	1.40	14,701	......	8.19
218	New River & Poca. Cons. C. & C. Co. (Layland No. 1).	Fire Creek	8346	A. R.	3.01	15.32	76.74	4.93	0.80	.....	....	.....	....	......	......	.....
218	New River & Poca. Cons. C. & C. Co. (Layland No. 1).	Fire Creek	8347	A. R.	2.44	15.48	76.50	5.58	0.70	.....	....	.....	....	......	......	.....
218	New River & Poca. Cons. C. & C. Co. (Layland No. 1).	Fire Creek	8348	R. A.	2.95	14.80	76.33	5.92	0.66	.....	....	.....	....	......	......	.....
218	New River & Poca. Cons. C. & C. Co. (Layland No. 1).	Fire Creek	8349	A. R.	3.24	15.53	76.31	4.92	0.80	.....	....	.....	....	......	......	.....
218	New River & Poca. Cons. C. & C. Co. (Layland No. 1).	Fire Creek	8425	A. R.	2.87	15.41	76.91	4.81	0.70	82.35	4.96	5.73	1.45	14,521	14,636	7.81
218	New River & Poca. Cons. C. & C. Co. (Layland No. 1).	Fire Creek	8425	A. D.	0.89	15.72	78.48	4.91	0.71	84.03	4.84	4.03	1.48	14,818	......	9.40
219	New River & Poca. Cons. C. & C. Co. (Layland No. 2).	Fire Creek	8234	A. R.	3.60	14.50	74.90	7.00	0.80	.....	....	.....	....	......	......	.....
219	New River & Poca. Cons. C. & C. Co. (Layland No. 2).	Fire Creek	8235	A. R.	4.40	15.50	75.80	4.30	0.70	.....	....	.....	....	......	......	.....
219	New River & Poca. Cons. C. & C. Co. (Layland No. 2).	Fire Creek	8236	A. R.	3.80	16.00	75.20	5.00	0.70	.....	....	.....	....	......	......	.....
219	New River & Poca. Cons. C. & C. Co. (Layland No. 2).	Fire Creek	8237	A. R.	3.10	16.00	75.00	5.90	0.70	.....	....	.....	....	......	......	.....
219	New River & Poca. Cons. C. & C. Co. (Layland No. 2).	Fire Creek	8298	A. R.	4.00	15.00	75.44	5.56	0.70	81.47	5.04	5.83	1.40	14,280	14,550	7.15
219	New River & Poca. Cons. C. & C. Co. (Layland No. 2).	Fire Creek	8298	A. D.	1.20	15.50	77.57	5.73	0.72	83.90	4.86	3.35	1.44	14,710	......	9.24
220	New River & Poca. Cons. C. & C. Co. (Layland No. 3).	Fire Creek	8350	A. R.	2.72	16.30	75.49	5.49	0.66	81.71	5.01	5.77	1.36	14,440	14,571	7.26
220	New River & Poca. Cons. C. & C. Co. (Layland No. 3).	Fire Creek	8350	A. D.	0.94	16.60	76.87	5.59	0.67	83.21	4.90	4.25	1.38	14,705	......	8.46
220	New River & Poca. Cons. C. & C. Co. (Layland No. 3).	Fire Creek	21502	A. R.	3.02	20.63	70.23	6.12	0.89	.....	....	.....	....	14 303	......	.....
220	New River & Poca. Cons. C. & C. Co. (Layland No. 3).	Fire Creek	21503	A. R.	2.21	20.21	70.34	7.24	0.74	.....	....	.....	....	14,135	......	.....
220	New River & Poca. Cons. C. & C. Co. (Layland No. 3).	Fire Creek	21504	A. R.	2.92	20.62	70.03	6.43	1.09	.....	....	.....	....	14,191	......	.....
220	New River & Poca. Cons. C. & C. Co. (Layland No. 3).	Fire Creek	21505	A. R.	2.70	19.64	71.64	6.02	0.72	.....	....	.....	....	14,303	......	.....
220	New River & Poca. Cons. C. & C. Co. (Layland No. 3).	Fire Creek	21506	A. R.	4.04	19.07	68.83	8.06	0.76	.....	....	.....	....	13,729	......	.....
220	New River & Poca. Cons. C. & C. Co. (Layland No. 3).	Fire Creek	21507	A. R.	2.90	20.55	69.72	6.83	0.86	81.25	4.84	4.64	1.58	14,150	......	7.08
	Average	Fire Creek	......	A. R.	3.19	16.83	74.48	5.50	0.69	81.79	4.93	5.62	1.46	14,386	14,598	7.39
	Average	Fire Creek	......	A. D.	0.81	17.72	75.94	5.53	0.65	83.86	4.77	3.60	1.49	14,721	14,774	9.23

Table Showing List of Mines Corresponding to Coal Analyses in Table 3, and Page References to Their Description.

No. on Map II.	Location of Mine.	Page of this Report
23	On Smithers Creek at Marting	504-6
25	At Longacre	507-8
36	Jodie, ½ mile SE	518
51	Page, 1.6 miles NE	538-48
52	Ansted, 1 mile N. 20° W	556-74
58	Powellton, 2.2 miles SE	581-600
79	Page, 1.2 miles NE	545-8, 630-5
90	Herberton, ¾ mile W	644-5
93	Parral (Summerlee), ¾ mile N. 15° W	656-7
102	Hawks Nest, 0.6 mile NE	682-4
104	At Sunnyside	684-5
107	Fayette Station, 0.7 mile NW	686-7
110	Mouth of Keeney Creek, ¼ mile NE	689-90
111	At Caperton	690-1
115	Winona, 0.8 mile due West	692-3
117	Winona, 1.2 miles N. 30° E	694-5
118	Divide, 0.35 mile S	695-6
119	Winona, 0.9 mile N. 60° E	696-7
120	Winona, 0.4 mile E	697-700
122	Winona, 0.9 mile S. 50° E	700-1
129	South Fayette Station, ¼ mile W	706-7
130	Kaymoor, 0.6 mile W	707-8
131	At Brown	709-10
132	Elverton, 0.4 mile N. 35° W	711-12
133	Opposite Caperton	712-13
135	Finlow (Brooklyn) 0.4 mile NW	714-17
139	Minden, E. edge	718-19
140	Minden, S. edge	719-20
141	Minden, W. edge	720-1
142	Minden, W. edge	721-4
143	At Lochgelly (formerly Stuart)	724-6
144	At Summerlee (formerly Parral)	726-7
145	Stonecliff, 0.5 mile W	728-9
151	Prudence, N. edge	731-2
152	Harvey, ½ mile NW	733-4
153	At Redstar	734-7
154	At Redstar	737-8
155	At Glen Jean	738-9
155A	Glen Jean, 0.4 mile SW	740-1
156	At Wingrove	741-2
157	Whipple Junction, 0.8 mile N. 50° E	742-3
158	At Carlisle	743-4
159	Carlisle, 0.3 mile NW	745-6
160	Whipple Junction, ½ mile S. 50° W	746-7
161	Sun, E. edge of	747-63
163	At Derryhale	746-7
165	Dunloup, ¾ mile SE	767-70
167	At Turkey Knob	770-1
168	At Macdonald	771-6
169	Macdonald, ½ mile W	776-7
172	Macdonald, ¾ mile SW	778-9
173	Macdonald, 1.2 miles SW	779-80
187	Red Ash, 0.8 mile W	798-9
188	At Rush Run	799-810
191	Thurmond, 1.3 miles NW	811-12
192	At Newlyn, 1 mile SW of Thurmond	812-13
196	Beury, ½ mile SW	817
198	Stonecliff, ½ mile E	821-2
199	Claremont, 1 mile NE	823-4
200	Stonecliff, 0.3 mile NE	824-5
201	Alaska, 0.3 mile N	825-6
203	At Ephraim	826-8
205	Terry, ¾ mile SW	814-15
209	Quinnimont, 2.4 miles NE	832-3
210	Lawton, 1 mile SW	833-4

No. on Map II.	Location of Mine.	Page of this Report
211	Lawton, 0.6 mile S.	834-5
213	Lawton, 0.2 mile SW.	836
215	Lawton, 1.7 miles N. 50° W.	837-9
217	Lawton, 0.7 mile NE.	839-44
218	Gentry, 1 mile S.	844-5
219	Gentry, 0.5 mile S.	845-6
220	At Gentry.	846-7

A large number of analyses made by the Technologic Branch of the United States Geological Survey of coal purchased by the U. S. Government under specifications for the fiscal year 1909-1910 are published, with averages, on pages 36, 39, 41, 42, 56, 65, 66, 67, 72, and 73 of Bulletin 41 of the U. S. Bureau of Mines, to which the reader is referred since it was impossible to secure the exact names and locations of the mines which delivered the coal.

The work of inspecting and analyzing coal delivered on Government contracts was transferred to the Bureau of Mines by an act of Congress effective July 1, 1910, and on pages 42-43 and 46-49 of Bulletin 119 of the latter Bureau are given average analyses of the coals analyzed for the United States Government during the fiscal years 1908-1915, those given on pages 42-43 being from Fayette County, while those on pages 46-49 are from Raleigh and Fayette Counties. The "Index Numbers" given on these pages are used in Table 4 following and in the abstracts of the contracts immediately following the table, since it was impossible to give all the mines the numbers on Map II corresponding to the same. In some instances two or three mines are combined under one 'Index Number" and in others, two or more beds are combined, the averages on pages 42-43 being of 813 analyses, while those on pages 46-49 from Raleigh and Fayette Counties are averages of 1839 analyses.

Table 4.—Coals analyzed for the United States Government during the fiscal years 1908-1915.

Index No.	Tons Delivered.	Proximate Analysis.					Calorific Value, Per Pound.			Number of Analyses Averaged.
		As Received	Dry Coal.							
		Moisture	Volatile Matter	Fixed Carbon	Ash	Sulphur	As Received.	Dry Coal	Moisture Free and Ash Free	
556	1,974	4.62	34.12	56.28	9.60	1.40	13,028	13.659	15,110	21
557	5,150	2.56	.....	.....	6.32	....	14,240	14,614	15,600	68
558	2,178	2.84	.....	.....	6.90	....	14,146	14.559	15,638	30
559	2,455	2.24	21.35	72.19	6.46	0.95	14,293	14,620	15,630	19
560	20	1.50	21.23	72.07	6.70	1.14	14,317	14 535	15,579	3
561	1,007	2.04	18.14	75.70	6.16	0.72	14,408	14,708	15,673	18
562	1,552	3.18	31.57	61.36	7.07	0.95	13,849	14,304	15,392	12
563	197	3.19	31.21	61.91	6.88	1.01	13,848	14,304	15,361	10
564	25,600	2.55	32.49	59.33	8.18	0.88	13,702	14,061	15,314	146
565	178	2.96	34.29	58.72	6.99	1.29	13,811	14,232	15,302	12
566	1,461	3.01	33.70	59.29	7.01	1.36	13,845	14.275	15,351	19
567	1,077	3.96	20.74	72.93	6.33	0.79	14,026	14,604	15,591	12
568	5,691	1.32	23.73	70.99	5.28	0.92	14,577	14,772	15,595	7
569	105	4.53	21.30	73.03	5.67	0.72	14,034	14,700	15,584	3
570	265	1.35	20.35	72.87	6.78	0.84	14 352	14,548	15,606	6
571	2,339	2.88	27.43	65.77	6.80	0.87	14,067	14,484	15,541	16
572	7,017	3.81	19.90	72.92	7.18	0.89	13,902	14,453	15,571	22
573	13,632	2.39	32.84	60.74	6.42	0.96	14 023	14,366	15,352	33
574	193	2.64	21.86	72.00	6.14	0.91	14,162	14,546	15,498	5
575	2,312	1.97	22.84	70.85	6.31	0.92	14,351	14,639	15.625	11
576	4,850	2.63	24.30	69.03	6.67	0.99	14.182	14,565	15,606	23
577	1,645	2.31	23.66	68.90	7.44	1.11	14.098	14,431	15,591	14
578	369	2.27	23.38	69 22	7.40	1.10	14,132	14,460	15,616	10
579	3,020	1.28	23.96	69.97	6.07	1.09	14,459	14,646	15,592	16
580	7,804	2.23	24.02	69.11	6.87	1.02	14 212	14,536	15,608	31
581	5,700	2.02	24.53	69.85	5.62	0.78	14,431	14,729	15,606	33
582	9,300	1.75	24.88	69.18	5.94	0.79	14,404	14,661	15,587	34
583	3,214	2.09	24.24	69.74	6.02	0.85	14,356	14,662	15,601	17
584	12,198	2.05	24.35	70.12	5.53	0.86	14,401	14,702	15,563	49
585	6,400	2.29	24.16	70.38	5.46	0.91	14,391	14.728	15,579	26
586	3,011	2.12	23.79	70.27	5.94	0.92	14,318	14,628	15 552	17
587	1,189	3.66	.....	.....	9.07	....	13,440	13,951	15,343	12
588	1,971	2.46	31.50	59.27	9.23	1.24	13,551	13.893	15,306	23
589	216	2.95	30.32	60.38	9.30	1.14	13,499	13,909	15,335	13
590	1,793	3.28	34.81	56.13	9.06	1.35	13,377	13,831	15,209	20
591	1,641	2.40	34.41	56.62	8.97	1.34	13 522	13,854	15,219	19
662	10,712	2.92	22.09	72.48	5.43	0.70	14,390	14,823	15,674	51
663	379	2.72	20.96	73.43	5.61	0.89	14,381	14,783	15,662	16
664	7,447	2.77	21.44	72.68	5.88	0.90	14,347	14,756	15,678	106
665	1.577	3.10	21.18	72.98	5.84	0.84	14,285	14,742	15,656	37
666	1,923	2.80	20.55	72.93	6.52	0.87	14,197	14,606	15,625	83
667	1,660	2.76	21.52	72.47	6.01	0.76	14.291	14,697	15,637	32
668	410	3.19	20.64	73.60	5.76	0.90	14,317	14,789	15,693	13
669	1,684	2.27	20.81	72.79	6.40	0.89	14,301	14,633	15,634	27
670	1,426	3.16	21.74	71.69	6.57	0.85	14,118	14,579	15,604	56
671	9,887	2.35	22.61	71.56	5.83	0.82	14,357	14,703	15,613	36
672	1,082	2.99	21.13	72.39	6.48	0.87	14,157	14,593	15,604	41
673	9,372	3.49	21.07	72.49	6.44	0.90	14,097	14,607	15,612	40
674	1,162	2.09	19.50	74.18	6.52	0.65	14,353	14,659	15,648	13
675	2,000	2.78	23.06	70.81	6.13	0.93	14,246	14,653	15,610	16
676	1,439	2.24	22.10	71.79	6.11	1.00	14,362	14,691	15,647	8
677	2,816	1.93	22.75	71.36	5.89	0.90	14.433	14,717	15.638	10
678	3,859	1.21	22.48	71.74	5.78	0.95	14,543	14,721	15,624	16
679	1,767	2.43	22.33	71.56	6.11	0.92	14,280	14,636	15,588	8
680	1,800	3.33	23.56	70.03	6.41	0.76	14,049	14,533	15,528	9
681	2,018	2.08	22.32	71.36	6.32	0.86	14.294	14,598	15,583	40
682	30,624	2.46	22.04	73.22	4.74	0.84	14,529	14,895	15,636	135
683	115,871	2.77	.....	.....	4.84	....	14,570	14,985	15,747	60
684	115 439	3.10	16.63	78.82	4.55	0.58	14,532	14,997	15,712	236
685	89,431	2.70	16.61	78.32	5.07	0.66	14 517	14,920	15,717	205
686	190,975	2.73	20.79	73.96	5.25	0.84	14.458	14,864	15.688	342
687	50,113	2.55	20.95	73.16	5.89	0.81	14,377	14,753	15,676	46
688	84,990	2.69	19.80	74.66	5.54	0.92	14,405	14,803	15,671	72
689	87 333	2.25	19.57	74.09	6.34	0.84	14,344	14.674	15,667	95

The data in regard to coal contracts covered by index numbers 556 to 591 are published on pages 89-92 of Bulletin 119 of the U. S. Bureau of Mines, while those for index numbers 662 to 689 are published on pages 96-98 of the above-mentioned Bulletin. These data have been combined with the location of the mine, name of mine, name of bed, commercial name of coal, size of coal, etc., given with the analyses in Table 4, and the probable number of the mine on Map II, and are as follows:

556. Cannelton; Cannelton mine; run-of-mine coal. Bituminous coal delivered to the post-office, Detroit, Mich., Treasury Department, 1912-13. Contract guaranties: 32 per cent. volatile matter, 1 per cent. sulphur, 7 per cent. ash, "dry coal"; 14,200 B. T. U., "as received." Price, $3.02 per ton.

557. Dubree and Sun, Rothwell and Sun mines (Nos. 119 and 161 on Map II); Sewell Coal; commercial name of coal, New River; run-of-mine coal. Semibituminous coal delivered to the main building of the Department of Agriculture, Washington, D. C., 1911-12. Contract guaranties: 6 per cent. ash, "dry coal"; 14,600 B. T. U., "as received." Price, $3.20 per ton.

559. From same mines as index number 557; nut and slack coal. Semibituminous coal delivered to the Municipal Building, Washington, D. C., 1911-12. Contract guaranties: 4.9 per cent. ash, "dry coal"; 14,600 B. T. U., "as received." Price, $3.10 per ton.

559. From same mine as index number 557; run-of-mine coal. Semibituminous coal delivered to the State, War and Navy Building, Washington, D. C., 1912-13. Contract guaranties: 2.5 per cent. moisture, "as received"; 4.8 per cent. ash, 14,900 B. T. U., "dry coal." Price, $3.39 per ton.

560. From same mines as index number 557; run-of-mine coal. Semibituminous coal delivered to the shops at the propagating gardens, Washington, D. C., War Department, 1912-13. Contract guaranties same as No. 559. Price, $3.50 per ton.

561. Dunloup, Prudence and Scarbro; Dunloup, Prudence, and Scarbro mines (Nos. 164?, 151, and 160 on Map II); Sewell Coal; commercial name of coal, New River; run-of-mine coal. Semibituminous coal delivered to the United States engineer office, Georgetown, S. C., War Department, 1912-13. Contract guaranties: 2.5 per cent. moisture, 1 per cent. sulphur, 6 per cent. ash, 14,500 B. T. U., "as received." Price, $3.48 per ton.

562. Elk Ridge; Elk Ridge mine; Powellton Coal; commercial name of coal, Kanawha gas; run-of-mine coal. Bituminous coal delivered to the United States court-house and post-office, Detroit, Mich., Treasury Department, 1909-10. Contract guaranties: 5 per cent. ash, "dry coal"; 14,360 B. T. U., "as received." Price, $2.90 per ton.

563. From same mine as index No. 562. Bituminous coal delivered to the custom-house, Detroit, Mich., Treasury Department, 1909-10. Contract guaranties and price same as No. 562.

564. Elk Ridge, Milburn, and Eagle; Elk Ridge, Milburn, and St. Clair mines (Nos. 60 or 61; 63 or 82; and 77 on Map II); Powellton and No. 2 Coal; commercial name of coal, Cando gas; run-of-mine coal. Bituminous coal delivered to the Central Branch of the National Home for Disabled Volunteer Soldiers, National Military Home, Ohio, 1911-12. Contract guaranties: 5 per cent. ash, "dry coal"; 14,410 B. T. U., "as received." Price, $2.55 per ton (2,000 pounds).

565. Harewood; Harewood mine (No. 25A on Map II); No. 2 Gas Coal; run-of-mine coal. Bituminous coal delivered to the customhouse, Detroit, Mich., Treasury Department, 1910-11. Contract guaranties: 8 per cent. ash, "dry coal"; 14,200 B. T. U., "as received." Price, $2.99 per ton.

566. From same mine as No. 565. Bituminous coal delivered to the United States court-house and post-office, Detroit, Mich., Treasury Department, 1910-11. Contract guaranties: 8 per cent. ash, "dry coal;" 14,200 B. T. U., "as received," Price, $2.99 per ton.

567. Layland and Minden; Layland and Minden mines (Nos. 218, 219, 220—Layland; 139, 140, 141, and 142—Minden, on Map II); Fire Creek and Sewell Coals; commercial name of coal, New River; run-of-mine coal. Semibituminous coal delivered to the post--office and subtreasury, Boston, Mass., Treasury Department, 1912-13. Contract guaranties: 22 per cent. volatile matter, 1.5 per cent. sulphur, 5 per cent. ash, "dry coal"; 14,500 B. T. U., "as received." Price, $4.15 per ton.

568. From same mines as No. 567. Semibituminous coal delivered to the United States engineer office, Jacksonville, Fla., War Department, 1913-14. Contract guaranties: 1.7 per cent. moisture, "as received"; 20.52 per cent. volatile matter, 0.7 per cent. sulphur, 6 per cent. ash, 14,900 B. T. U., "dry coal." Price, $4.74 per ton.

569. From same mines as No. 567. Semibituminous coal delivered to Fort Banks, Mass., Quartermaster Corps, War Department, 1913-14. Contract guaranties: 2 per cent. moisture, "as received"; 7 per cent. ash, 14,500 B. T. U., "dry coal." Price, $4.45 per ton.

570. From same mines as No. 567. Semibituminous coal delivered to Forts Crockett, Travis, and San Jacinto, Tex., Quartermaster Corps, War Department, 1913-14. Contract guaranties: 0.8 per cent. moisture, "as received"; 19.9 per cent. volatile matter, 0.7 per cent. sulphur, 9.7 per cent. ash, 13,960 B. T. U., "dry coal." Price, $7.50 per ton.

571. Long Branch; Long Branch Mine (No. 55 on Map II); No. 2 Gas Coal; commercial name of coal, Long Branch; run-of-mine coal. Bituminous coal delivered to the United States engineer office, Georgetown, S. C., War Department, 1914-15. Contract guaranties: 1.72 per cent. moisture "as received"; 27.24 per cent. volatile matter, 0.86 per cent. sulphur, 4.03 per cent. ash, 14,800 B. T. U., "dry coal." Price, $3.64 per ton (2,000 pounds).

572. Macdonald and Glen Jean; Macdonald and Collins mines (Nos. 168 and 155 on Map II); Sewell Coal; commercial name of coal, New River Smokeless; run-of-mine coal. Semibituminous coal delivered to Northwestern Branch of the National Home for Disabled Volunteer Soldiers, National Home., Wis., 1910-11. Contract guaranties: 6 per cent. ash, "dry coal"; 14,750 B. T. U., "as received." Price, $3.67 per ton (2,000 pounds).

573. Milburn; Milburn mine (No. 82 on Map II); Eagle Coal; commercial name of coal, Milburn gas; run-of-mine coal. Bituminous coal delivered to the Central Branch of the National Home for Disabled Volunteer Soldiers, National Military Home, Ohio, 1910-11. Contract guaranties: 6 per cent. ash, "dry coal"; 14.300 B. T. U., "as received." Price, $2.50 per ton (2,000 pounds).

574. Minden; Minden mine (Nos. 139-142?); Sewell Coal; run-of-mine coal. Semibituminous coal delivered to the third lighthouse district, Newport, R. I., Bureau of Lighthouses, Department of Commerce, 1914-15. Contract guaranties: 4 per cent. moisture, "as received"; 22 per cent. volatile matter, 2 per cent. sulphur, 10 per cent. ash, "dry coal"; 13,900 B. T. U., "as received." Price, $5.60 per ton.

575. Prudence; Prudence mine (No. 151 on Map II); Sewell Coal; commercial name of coal, New River; run-of-mine coal. Semibituminous coal delivered to the New National Museum, Washington, D. C., Smithsonian Institution, 1912-13. Contract guaranties: 3 per cent. moisture, "as received"; 4 per cent. ash, 14,850 B. T. U., "dry coal." Price, $3.10 per ton.

576. From same mine as No. 575. Semibituminous coal delivered to the main building of the Department of Agriculture, Washington, D. C., 1912-13. Contract guaranties: 2.5 per cent. moisture, "as received"; 3.5 per cent. ash, 14,900 B. T. U., "dry coal." Price, $3.19 per ton.

577. From same mine as No. 575. Semibituminous coal delivered to the Treasury Building, Washington, D. C., Treasury Department, 1912-13. Contract guaranties: 2.5 per cent. moisture, "as received"; 3.5 per cent. ash, 14,900 B. T. U., "dry coal." Price, $3.40 per ton.

578. From same mine as No. 575. Semibituminous coal delivered to the Winder Building, Washington, D. C., Treasury Department, 1912-13. Contract guaranties: 2.5 per cent. moisture, "as received"; 3.5 per cent. ash, 14,850 B. T. U., "dry coal." Price, $3.45 per ton.

579. From same mine as No. 575. Semibituminous coal delivered to the Government Printing Office, Washington, D. C., 1912-13. Contract guaranties: 2.5 per cent. moisture, "as received"; 3.5 per cent. ash, 14,900 B. T. U., "dry coal." Price, $3.35 per ton.

580. From same mine as No. 575. Semibituminous coal delivered to the Bureau of Engraving and Printing, Washington, D. C., Treasury Department, 1912-13. Contract guaranties same as No. 579. Price, $3.09 per ton.

581. Redstar; Star mine (No. 153 on Map II); Sewell Coal; commercial name of coal, New River; run-of-mine coal. Semibituminous coal delivered to the main building of the Department of Agriculture, Washington, D. C., 1913-14. Contract guaranties: 2.5 per cent. moisture, "as received"; 22.64 per cent. volatile matter, 1 per cent. sulphur, 4.8 per cent. ash, 14,900 B. T. U., "dry coal." Price, $3.42 per ton.

582. From same mine as No. 581. Semibituminous coal delivered to the Bureau of Engraving and Printing, Washington, D. C., Treasury Department, 1913-14. Contract guaranties same as No. 581. Price, $3.38 per ton.

583. From same mine as No. 581. Semibituminous coal delivered to the State, War, and Navy Building, Washington, D. C., 1913-14. Contract guaranties same as No. 581. Price, $3.59 per ton.

584. From same mine as No. 581. Semibituminous coal delivered to the Bureau of Engraving and Printing, Washington, D. C., Treasury Department, 1914-15. Contract guaranties same as No. 581. Price, $[illegible] per ton.

585. From same mine as No. 581. Semibituminous coal delivered to the Department of Agriculture, Washington, D. C., 1914-15. Contract guaranties same as No. 581. Price, $3.41 per ton.

586. From same mine as No. 581. Semibituminous coal delivered to the State, War, and Navy Building, Washington, D. C., 1914-15. Contract guaranties same as No. 581. Price, $3.59 per ton.

587. [illegible]; Oakland mine (No. 68? or 69? on Map II); Eagle No. 1 and 2 Coal; commercial name of coal, Richwood; run-of-mine coal. Bituminous coal delivered to the United States court-house and

post-office, Detroit, Mich., Treasury Department, 1907-8. Contract guaranties: 4.36 per cent. ash, "dry coal"; 14,000 B. T. U., "as received." Price, $3.30 per ton.

588. From same mine as No. 587. Bituminous coal delivered to the United States court-house and post-office, Detroit, Mich., Treasury Department, 1911-12. Contract guaranties: 7.63 per cent. ash, "dry coal"; 14,200 B. T. U., "as received." Price, $2.97 per ton.

589. From same mine as No. 587. Bituminous coal delivered to the custom-house, Detroit, Mich., Treasury Department, 1911-12. Contract guaranties and price same as No. 588.

590. From same mine as No. 587. Bituminous coal delivered to the post-office, Detroit, Mich., Treasury Department, 1913-14. Contract guaranties: 7.63 per cent. ash, "dry coal"; 14,000 B. T. U., "as received." Price, $3.15 per ton.

591. From same mine as No. 587. Bituminous coal delivered to the United States court-house and post-office, Detroit, Mich., Treasury Department, 1914-15. Contract guaranties: 32 per cent. volatile matter, 1.5 per cent. sulphur, 8 per cent. ash, "dry coal"; 14,000 B. T. U., "as received." Price, $3.05 per ton.

In the table on pages 46-49 of Bulletin 119 of the U. S. Bureau of Mines giving the analyses from Raleigh and Fayette Counties, the location of none of the mines is given, all being marked "various mines", the commercial name of the coal in each case being "New River", and the size of coal shipped, "run-of-mine", except for No. 675 which was "nut and slack". No name of bed was given for No. 662, No. 669, and Nos. 683 to 689, both inclusive, the others being listed as from the Sewell; Sewell and Beckley; Sewell, Beckley, and Fire Creek; or Sewell and Fire Creek. In the following data concerning the contracts in question, only the name of the bed, when given, appears in addition to the data given on pages 96-98 of the Bulletin mentioned above:

662. Semibituminous coal delivered to the Southern Branch of the National Home for Disabled Volunteer Soldiers, National Soldiers' Home, Va., 1910-11. Contract guaranties: 4 per cent. ash, "dry coal"; 14,750 B. T. U., "as received." Price, $2.89 per ton.

663. Sewell Coal. Semibituminous coal delivered to Winder Building, Washington, D. C., Treasury Department, 1910-11. Contract guaranties: 5 per cent. ash, "dry coal"; 14,700 B. T. U., "as received." Price, $3.35 per ton.

664. Sewell Coal. Semibituminous coal delivered to the Bureau of Engraving and Printing, Washington, D. C., Treasury Department, 1910-11. Contract guaranties: 4 per cent. ash, "dry coal"; 14,710 B. T. U., "as received." Price, $3.19 per ton.

665. Sewell Coal. Semibituminous coal delivered to the Treasury Building, Washington, D. C., Treasury Department, 1910-11. Contract guaranties: 5 per cent. ash, "dry coal"; 14,700 B. T. U., "as received." Price, $3.30 per ton.

666. Sewell Coal. Semibituminous coal delivered to Fort Williams, Me., Quartermaster Corps, War Department, 1911-12. Contract guaranties: 6 per cent, ash, "dry coal"; 14,300 B. T. U., "as received." Price, $4.65 per ton, delivery at Portland, Me.

667. Sewell and Beckley Coals. Semibituminous coal delivered to Fort Monroe, Va., Quartermaster Corps, War Department., 1911-12. Contract guaranties: 6 per cent. ash, "dry coal"; 14,600 B. T. U., "as received." Price, $3.11 per ton for delivery to post and $3.29 per ton for delivery at artillery school.

668. Sewell Coal. Semibituminous coal delivered to the Winder Building, Washington, D. C., Treasury Department, 1911-12. Contract guaranties: 5 per cent. ash, "dry coal"; 14,600 B. T. U., "as received." Price, $3.50 per ton.

669. Semibituminous coal delivered to Fort Monroe, Va., Quartermaster Corps, War Department, 1912-13. Contract guaranties: 2.5 per cent. moisture, "as received"; 6 per cent. ash, 14,850 B. T. U., "dry coal." Price, $3.09 per ton for delivery at the artillery school.

670. Sewell Coal. Semibituminous coal delivered to Fort Williams, Me., Quartermaster Corps, War Department, 1912-13. Contract guaranties: 4.5 per cent. moisture, "as received"; 6 per cent. ash, 14,500 B. T. U., "dry coal." Price, $4.80 per ton, delivery at Portland, Me.

671. Sewell and Beckley Coals. Semibituminous coal delivered to the Southern Branch of the National Home for Disabled Volunteer Soldiers, National Soldiers' Home, Va., 1912-13. Contract guaranties: 2 per cent. moisture, "as received"; 4 per cent. ash, 14,950 B. T. U., "dry coal." Price, $2.76 per ton.

672. Sewell Coal. Semibituminous coal delivered to Fort Williams, Me., Quartermaster Corps, War Department, 1913-14. Contract guaranties: 3.5 per cent. moisture, "as received"; 22 per cent. volatile matter, 1 per cent. sulphur, 6 per cent. ash, 14,300 B. T. U., "dry coal." Price, $5.30 per ton for delivery at post and $4.90 per ton for delivery to vessels.

676. Sewell Coal. Semibituminous coal delivered to the Treasto Southern Branch of the National Home for Disabled Volunteer Soldiers, National Soldiers' Home, Va., 1913-14. Contract guaranties: 3 per cent. moisture, "as received"; 22 per cent. volatile matter, 0.95 per cent. sulphur, 6.5 per cent. ash, 14,800 B. T. U., "dry coal." Price $3.13 per ton.

674. Sewell, Beckley and Fire Creek Coals. Semibituminous coal delivered to the United States engineer office, Georgetown, S. C., War Department, 1912-13. Contract guaranties: 2.5 per cent. moisture, 1 per cent. sulphur, 6 per cent. ash, 14,500 B. T. U., "as received." Price, $3.65 per ton (2,000 pounds).

675. Sewell Coal. Semibituminous coal delivered to the District Building, Washington, D. C., 1913-14. Contract guaranties: 3 per cent. moisture, "as received"; 22 per cent. volatile matter, 1 per cent. sulphur, 5 per cent. ash, 15,000 B. T. U., "dry coal." Price $3.65 per ton.

676. Sewell Coal. Semibituminous coal delivered to the Treasury Building, Washington, D. C., Treasury Department, 1913-14. Contract guaranties: 3.5 per cent. moisture, "as received"; 5 per cent. ash, 15,000 B. T. U., "dry coal." Price, $3.95 per ton.

677. Sewell Coal. Semibituminous coal delivered to the New National Museum, Washington, D. C., Smithsonian Institution, 1913-14. Contract guaranties: 3 per cent. moisture, "as received"; 5 per cent. ash 15,000 B. T. U., "dry coal." Price, $3.90 per ton.

678. Sewell Coal. Semibituminous coal delivered to the Government Printing Office, Washington, D. C., 1913-14. Contract guar-

anties: 3 per cent. moisture, "as received"; 22 per cent. volatile matter, 1 per cent. sulphur, 5 per cent. ash, 15,000 B. T. U., "dry coal." Price, $3.75 per ton.

679. Sewell Coal. Semibituminous coal delivered to the Treasury Building, Washington, D. C., Treasury Department, 1914-15. Contract guaranties: 3 per cent. moisture, "as received"; 22 per cent. volatile matter, 1 per cent. sulphur, 5 per cent. ash, 14,895 B. T. U., "dry coal." Price, $3.73 per ton.

680. Sewell Coal. Semibituminous coal delivered to the District Building, Washington, D. C., 1914-15. Contract guaranties: 2.5 per cent. moisture, "as received"; 22 per cent. volatile matter, 1 per cent. sulphur, 5 per cent. ash, 14,895 B. T. U., "dry coal." Price $3.64 per ton.

681. Sewell and Fire Creek Coals. Semibituminous coal delivered to Fort Monroe, Va., Quartermaster Corps, War Department, 1914-15. Contract guaranties: 2.5 per cent. moisture, "as received"; 6 per cent. ash, 14,850 B. T. U., "dry coal." Price, $3.505 per ton for delivery at fort, and $3.22 per ton f. o. b. vessels at Norfolk,, Va.

682. Sewell Coal. Semibituminous coal delivered to the navy yard at Washington, D. C., Navy Department, 1914-15. Contract guaranties: 3 per cent. moisture, "as received"; 22 per cent. volatile matter, 1 per cent. sulphur, 4 per cent. ash, 14,900 B .T. U., "dry coal." Price, $3.05 per ton.

683. Semibituminous coal delivered to the Panama Railroad Co., Newport News, Va., 1908-9. Contract guaranty: 14,600 B. T. U. "as received." Price, $2.65 to $2.80 per ton, f. o. b. steamers; April 1 to August 31, 1908, $2.65; September 1, 1908, to March 31, 1909, $2.80.

684 and **685.** Semibituminous coal delivered to the Panama Railroad Co., at Sewalls Point, Norfolk, Va., 1910-11. Contract guaranty: 14,600 B. T. U., "as received." Price, $2.60 per ton.

686. Semibituminous coal delivered to the Panama Railroad Co., Newport News Va., 1911-12. Contract guaranty: 14,600 B. T. U., "as received." Price, $2.51 per ton.

687. Semibituminous coal delivered to the Panama Railroad Co., Newport News, Va., 1912-13. Contract guaranty: 14,800 B. T. U., "dry coal." Price, $2.70 per ton.

688. Semibituminous coal delivered to the Panama Railroad Co., at Sewells Point, Norfolk, Va., 1912-13. Contract guaranty: 14,800 B. T. U.; "dry coal." Price, $2.70 per ton.

689. Semibituminous coal delivered to the Panama Railroad Co., at Sewalls Point, Norfolk, Va., 1913-14. Contract guaranty and price same as No. 688.

CHAPTER XII.

CLAYS, ROAD MATERIAL, BUILDING STONE, GLASS-SAND, WATER-POWER AND FORESTS.

CLAYS.

A general review of the clays and the clay industry in West Virginia is given in Volume III of the State Geological Survey Reports by G. P. Grimsley, published in 1905, along with an exhaustive discussion of the origin, chemical and physical properties and classification of clays. The reader is referred to that volume for such data, as also the technology of the clay industry, the following quotation from page 225 being pertinent thereto as to the Kanawha Valley region:

> "In the Charleston region there have been a number of brick plants in operation at various times, a number of which have been unsuccessful on account of poor business management rather than on account of the quality of the clays. The first brick paved street in the United States was laid in Charleston in 1872. One block of Summers Street, nearest the Kanawha River, was paved with brick set on sand, with a sub-structure of planks dipped in tar and also resting on sand. This block is still in use, and the street at this day (in 1905) is in very fair condition. For a number of years after that date (1872), the Charleston brick were shipped into Ohio, and the first brick paved streets in Columbus in the early 80's were laid with the Charleston brick set on tarred planks.
>
> "With the opening of the paving industry in Ohio, the sale of the Charleston brick was confined to the State, and in later years they were used mainly for local trade, very few paving brick being shipped away."

According to C. E. Krebs[1], the paving in the above mentioned street was relaid in the year 1911, thus giving 39 years for the life of the first brick pavement laid in the United States.

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[1] Kanawha County Report, W. Va. Geological Survey, p. 579; 1914.

ABSENCE OF DEVELOPMENT.

There is not a single brick or pottery plant utilizing the clays or shales in Fayette County, although there is almost an inexhaustible supply of both raw material and cheap fuel—coal—with which to burn it. The large and growing demand for both building and paving brick, due to the growth of mining towns and the great demand in recent years for permanent road surfaces surely warrants the establishment of brick plants within the County, this being specially true for the high plateau region southward from Fayetteville to the Raleigh County Line. The nearest available source of supply for brick at present is the Charleston region of Kanawha County, 72 miles by railway from Macdonald.

AVAILABLE CLAY.

Transported Clay.

Transported clay of the alluvial form, represented largely by the Quaternary deposits on Map II—unconsolidated clays, sand beds, and gravel on the flood-plains and terraces along the valley-floors of the Kanawha River and other large streams—occurs in abundance, its thickness ranging from 5 to 50 feet. The detailed log of the B. H. Early No. 1 Well—No. 31 on Map II—published on pages 370-371, records 45 feet of quicksand and gravel, although starting 10 to 15 feet below the general level of the valley-floor at Montgomery. Since a large percentage of these deposits is derived from the more or less argillaceous beds of the Kanawha Group and those of the Mauch Chunk and older rocks outcropping in the drainage basin of New River, they should burn into a fair quality of building brick; in fact, these have been successfully utilized for this purpose in the Charleston region. The location of a brick plant to develop these beds should be selected with the idea of securing the most favorable point for the distribution of the manufactured product, the amount of alluvial clay available, proximity of coal for fuel and lowest expense of handling the raw material. A study of

Map II, which shows the location of the Quaternary deposits and the existing steam railway lines, shows that the wide bottoms along both sides of the Kanawha River between Boomer and Deepwater probably best fill these requirements.

Residual Clay.

Residual clay, derived from the weathering of rocks in situ, does not occur in Fayette in sufficient amount and purity to warrant its classification as a commercial asset in the clay resources of the County, its chief economic worth being judged more by its effect on the soil for agricultural purposes.

Stratified Shales.

The several argillaceous shale beds in the basal half of the Kanawha Group; in that portion of the New River Group between the Lower Nuttall and Upper Raleigh Sandstones; and in the Mauch Chunk Series, constitute by far the greatest source of supply of the raw material for the manufacture of both building and paving brick that may be found in the County. The outcrops of these three divisions of the rock column are exhibited in detail on Map II, a glance at which shows them intersected by feasible transportation lines.

In the Kanawha Group attention is called to the argillaceous nature frequently characteristic of the Douglas Shale previously described in Chapter VI, page 275. It is usually dark-gray to black in color and sometimes carries a high percentage of alumina, this being specially true in the eastern portion of Falls District and in Mountain Cove District. As it belongs only 5 to 15 feet above the base of the Kanawha Group, its outcrop should follow closely the same region as that outlined on Map II for the division line between the latter formation and the New River Group.

In the New River Group the shale beds between the Lower Nuttall and Upper Raleigh Sandstones are often very argillaceous, this being specially true on the high plateau in the central portion of Fayetteville District. In this locality the exposure of the **Lower Iaeger Shale,** described in Chapter VII, page 304, warrants further investigation. Judging from its color and physical appearance here, it should burn into a fair quality of both building and paving brick. The location is in the midst of a highly developed coal mining region, as also in a fair agricultural locality, thus insuring a local demand for both building and paving brick and a cheap fuel supply sufficient to warrant the establishment of a small plant.

A general description of the Mauch Chunk Red Shales has already been given in Chapter IX, pages 332-335. Their outcrop in Fayette, as shown on Map II, is confined mostly to the steep hillsides of the New River gorge above Thurmond, and the waters of Meadow and Sewell Creeks in the southeast portions of Sewell Mountain and Quinnimont Districts. These red shales and the clays resulting from their weathering, should in many localities make a good quality of red brick adapted for both building and paving purposes, especially so for the manufacture of a beautiful pressed building brick. The most feasible locality to establish a brick plant in Fayette to operate these shales, from the standpoint of availability, transportation, and cheap fuel (coal), is apparently along the Sewell Valley Railway between Meadow Bridge and Rainelle. The analyses published on page 205 of Volume III of the State Survey Reports give a fair idea of the average chemical composition of these red shales.

Fire Clay.

No deposits of good fire clay of either the plastic or flint variety were observed in Fayette. That, associated with the coal beds, appears either too thin or impure to be of economic importance as it usually carries too high a percentage of silica and the fusible elements for the manufacture of ware requiring high refractory qualities.

ROAD MATERIAL.

RIVER AND CREEK GRAVEL.

The author has called attention in previous County Reports of the State Survey to the almost inexhaustible supply of gravel along the beds and banks of the streams, a form of valuable road surfacing material that has not been appreciated as it should. This gravel not only occurs in abundance and in convenient locations, but it also possesses very durable qualities, since much of it is derived from the hard and quartzitic sandstone ledges of the Pottsville, and it has been worn down by attrition to sizes suitable for direct application to the road surface, a feature that saves the additional expense of crushing, and when so placed, it is self-draining. Its use is recommended on many of the minor roads in the County, which are not subjected to very heavy traffic.

LIMESTONE.

The limestones of Fayette are confined to the Kanawha Group, all of which have been described in Chapter VI. These consist of mere lenses and concretions from a few inches to 3 feet in thickness, constituting a supply so meager that they may be disregarded from a road material standpoint. Southeastward in the adjoining Counties of Summers and Greenbrier, there is an inexhaustible supply available from the outcrop of the great Greenbrier Limestone along the main line of the Chesapeake & Ohio Railroad that could be drawn upon without great expense in transportation, especially in the coal mining regions of Fayette, which have good railway facilities.

SANDSTONE.

The many hard sandstone ledges of the Allegheny and Pottsville Series outcropping in Fayette and described in detail in Chapters V-VIII, inclusive, should furnish an inexhaustible supply of rock material that would crush into sand suitable for use in the manufacture of concrete for the various forms of highway construction. The crushed rock from similar ledges has given fair satisfaction on improved roads in McDowell County when applied directly as surfacing material, on highways subjected to light traffic.

BRICK.

The use of brick, manufactured from stratified shales and clay, has forged rapidly to the front as a road surfacing material during the last decade, this being largely due to its established durability and cheapness of maintenance, when subjected to all forms of traffic. The greatest objection against it appears to be the first cost. In this connection, the following table, in which the first cost per lineal mile is based on roads already constructed in the State with a width of 14 feet, should prove of interest, the data being furnished by A. D. Williams, State Road Engineer, and the variation in cost depending mostly on the transportation expense for the material used:

Surfacing Material	Cost per Lineal Mile.
Gravel	$ 500 to $ 3.000
Macadam	600 to 7,500
Concrete	7,450 to 16,500
Brick	15,000 to 21,000

In Fayette, it is the author's belief that material in abundance for the manufacture of good paving brick, if properly burned, is obtainable from the sources described under "Clays" on preceding pages of this Chapter, with a resulting reduction in cost on account of transportation charges.

BUILDING STONE.

The **sandstone quarries** in Fayette have been described in detail under their respective geological horizons in Chapters V-IX, inclusive. The following table gives a list of these, arranged in descending order and classified by Series, along with page references to their descriptions:

Name of Sandstone.	Location of Quarry.	Page of this Report
In Kanawha Group, Pottsville:		
Upper Gilbert	[illegible] **(No. 1 on Map II)**	[illegible]
Dotson	[illegible] S.E. [illegible] **(No. 2 on Map II)**	[illegible]
	[illegible] **(No. 3 on Map II)**	[illegible]
In New River Group, Pottsville:		
[illegible]	**Nos. 4, 5, 6 and 7 on Map II,** on [illegible]	[illegible]
Lower Nuttall	[illegible] **(No. 8 on Map II,)**	[illegible]
[illegible]	[illegible]	[illegible]
In Mauch Chunk Series:		
[illegible]	[illegible]	[illegible]
	[illegible] **No. 9 on Map II.**	[illegible]

AVAILABLE STONE.

The only stone available for building purposes in Fayette are the sandstone ledges of the Allegheny, Pottsville, and Mauch Chunk Series, the limestone beds, as mentioned on a preceding page of this Chapter under "Road Material", being too thin and irregular to have any economic importance other than to slightly enrich the soil in the immediate region of their outcrops. The sandstones range from flaggy and shaly beds, lacking the essential cohesiveness for building purposes, to great massive, current-bedded and more or less quartzitic ledges, 25 to 100 feet or more in thickness, some of which will split into building blocks of almost any desired size. The latter type is represented by the Upper East Lynn and East Lynn of the Allegheny Series; Homewood, Upper Coalburg, Upper Winifrede, Upper Gilbert, and Dotson of the Kanawha Group; Upper Nuttall, Lower Nuttall, Harvey Conglomerate, Guyandot, Lower Guyandot, Upper Raleigh, Lower Raleigh, and Pineville of the New River Group of the Pottsville Series. These have all been described in preceding Chapters of this report, references to which are given in the Table of Contents and in the Index. Owing to the highly siliceous nature of these ledges, stone from them possesses very durable qualities, but the current-bedded nature of many of them with exposures renders them more suitable for rough stone work, such as coke-ovens, bridge piers, foundations, retaining walls, mining buildings, and concrete aggregate, being too irregular in bedding and texture for ornamental forms. The pinkish color and fairly uniform texture of the Upper Nuttall ledge in the vicinity of Fayetteville, and the middle portion of the Lower Nuttall at Herberton, present an attractive appearance in the buildings already constructed from them.

GLASS-SAND.

QUARRIES.

New River Silica Company.—In the western edge of Quinnimont District this company operates the only plant and quarry for the manufacture of glass-sand in the County. The quarry is located near the crest of the east hillside of New River, 0.5 mile northeast of Ephraim, at an elevation of 2610′ B., in the **Upper Raleigh Sandstone** ledge, as determined by the author, the quarry-face being about 300 feet long; 25 to 30 feet high; and is worked back eastward from the outcrop of the ledge a distance of 50 to 60 feet. The soil cover to be removed ranges from 0 to 12 inches. The company has a lease on a tract of 700 acres. The raw stone is carried off the mountain by two 6-ton monitors over an incline railway—3300 feet in length—to a crushing and washing plant on the main line of the Chesapeake & Ohio Railroad, just above the mouth of Buffalo Creek, where it is crushed, washed, screened, and dried. According to Mr. T. H. Price, Superintendent, and Mr. S. B. Thomas, a stockholder in the company whose principal office is located at Hinton, W. Va., the plant first started to operate in the summer of 1915 and in October, 1916, 25 to 30 men were employed at the quarry and crushing plant, the average daily output being about 150 tons of prepared sand. The latter brings $1.50 per ton and is shipped mostly west to glass manufacturing plants in West Virginia at Dunbar, St. Albans, and Huntington, the sand being adapted to the manufacture of both window and flint glass ware.

The author collected two samples for analysis—**No. 922H** from the raw stone at the quarry and **No. 921H** from the prepared sand at the plant, the composition of which, as reported by Messrs. Hite and Krak, of the Survey Staff, is as follows:

	No. 922H.	No. 921H.
Silica (SiO_2)	98.48	99.22
Ferric Iron (Fe_2O_3)	0.16	0.08
Alumina (Al_2O_3)	0.75	0.31
Calcium Carbonate ($CaCO_3$)	0.02	0.14
Magnesium Carbonate ($MgCO_3$)	0.09	0.02
Loss on ignition	0.50	0.23
Totals	100.00	100.00

The results show a very pure sand that is suitable for the manufacture of the finest flint ware requiring great brilliancy and uniform density.

AVAILABLE SAND.

There is an inexhaustible supply of sandstone available for the manufacture of glass-sand in Fayette County. As shown by the above data, the **Upper Raleigh** ledge is the only one that has yet been worked. Southward in Quinnimont District from the plant last described to the valley of Laurel Creek there is a large acreage of this stratum capping the ridges with but little cover to be removed in quarrying. Here it possesses the same physical appearance of grayish-white color as at the quarry of the New River Silica Company, and no doubt the same high-grade sand could be produced.

The **Pineville Sandstone** outcrops in grayish-white and quartzitic cliffs 30 to 50 feet in thickness along both hillsides of Meadow River southeastward from the mouth of Burdette Creek to Rainelle. At the mouth of the latter stream the author collected a sample for analysis, the composition of which, as reported by Messrs. Hite and Krak, is as follows:

	No. 916H.
Silica (SiO_2)	98.93
Ferric Iron (Fe_2O_3)	0.07
Alumina (Al_2O_3)	0.41
Calcium Carbonate ($CaCO_3$)	0.16
Magnesium Carbonate ($MgCO_3$)	0.02
Loss on ignition	0.41
Total	100.00

The results indicate a sandstone of the same high grade and purity from a glass-sand standpoint as the Upper Raleigh ledge at the quarry of the New River Silica Co., described above. There is an almost inexhaustible supply of the Pineville ledge available in Fayette, and, since it belongs only 30 to 50 feet below the Fire Creek Coal, its outcrop should follow closely the same regions as that outlined for the latter bed on Map II.

The Upper Raleigh and Pineville Sandstones offer such an abundant supply of high-grade glass-sand, that other ledges—Lower Nuttall and Lower Raleigh—only slightly less pure, were not sampled.

WATER-POWER.

PRESENT DEVELOPMENT.

Electro Metallurgical Company, Kanawha Works.—The only utilization on a commercial scale of the water-power resources of Fayette County is the plant of the Electro Metallurgical Company at Glen Ferris on the north side of the Falls of the Kanawha River, the principal office of the latter company being at the latter town and the New York City office in the 42nd Street Building. It has constructed just above the crest of the Falls a dam 2600 feet in length and 6.5 to 7 feet in height, giving a total fall of 22 feet available for water-power under normal conditions, according to Geo. T. Lancaster, Cashier, who is authority for data concerning this plant.

The product manufactured is ferro-chromium which is used for hardening purposes in the manufacture of armor plate, projectiles, and high-speed tool steel. The raw materials utilized are chrome ore, coke, and lime. The chrome ore is imported principally from South Africa. Domestic ore from the State of California has recently been tried, but its quality is inferior and the known supply reported about exhausted. The process of the manufacture was not revealed. The plant employs 52 men—30 skilled and 22 ordinary laborers, and it has an average monthly output of 350 tons of ferro-chromium.

The power equipment consists of 10 McCormick turbines—six 48-inch; two 30-inch; one 27-inch; and one 24-inch. The six 48-inch turbines are each connected to a separate 350-KW alternating current generator; the two 30-inch, to one 375-KW alternating current generator; the 24-inch, to a 60-KW alternating current generator; and the 27-inch to a three stage centrifugal pump. The foregoing turbine equipment should produce in its maximum development about 2700 horse-power, the minimum, during very low water stages and ordinary flood conditions probably being 50 per cent. less, and practically zero at very high flood stages.

According to reliable information furnished by natives of Fayette County, this company obtained about 20 years ago a 99-year lease from Chas. Reeder Heirs, of Baltimore, Maryland, on the Falls and a tract of 500 acres immediately adjoining on the south side of the river, and, owing to leaks in the dam only about one-half the water flow is available for power in the lowest water stages recorded.

AVAILABLE WATER-POWER.

With the exception of the plant at Kanawha Falls, no other attempt on a commercial scale has been made to develop the vast amount of hydro-electric power available on the large streams in Fayette, although there are many small water-wheel mills along the smaller streams to grind the grain of the immediate region. The most important streams for the development of such power on a commercial basis are the Kanawha, New, Gauley, and Meadow Rivers, descriptions of which, their rate of fall, area of their drainage basins, and gauging records kept by the U. S. Geological Survey in cooperation with the W. Va. Geological Survey, are given in Chapter II, pages 39, 42, and 67, 33-6, 37-9, and 39-83, respectively. A study of the gauging records shows that the run-off during the winter and spring months is high and that for the summer and fall correspondingly low; hence, in any contemplated plan of development, the construction of large impounding reservoirs should be taken into consideration in order to equalize the flow available at the power-plants. The remote-ness of great cities for a ready market of the electric current that could be produced and the immediate presence of a great available tonnage of a high-grade steam coal as a competitive factor operate against the establishment of such plants at this time. Other serious drawbacks are the presence of considerable towns, railway lines, and valuable coal beds low down near the valley floor, the flooding of which in many localities would make the cost of condemnation prohibitive. As these coal seams approach exhaustion under the rapidly developing mining operations in the not far remote future, then this vast permanent source of energy should be drawn upon.

The five following tables, showing the indicated horsepower developed by the above-mentioned streams and the location of reservoir sites, are taken from pages 399, 404-5, and 412-13 of the Semi-Centennial History of West Virginia, by Dr. J. M. Callahan, the tables in question being part of a special article on "Water-Power Resources of West Virginia" by A. H. Horton, District Engineer, Water-Resources Branch, U. S. Geological Survey, published in 1913:

Table No. 2—Indicated Horse-power Developed by New-Kanawha River in West Virginia.

Section of River		Length, Miles.	Mean Drainage Area. Square Miles	Minimum Discharge, sec. ft.	Assured Drainage for maximum Development, sec. ft.	Total Fall in Feet	Minimum Horse-power	Assumed Maximum Development Horse-power	Horse-power Available from storage for		
From	To								12 months	6 months	3 months
Below Island Creek	Above Greenbrier R.	20	4,220	1,990	3,810	77	14,000	26,000	......	....	....
Below Greenbrier R.	1,200 ft. Contour	20	6,300	2,140	5,000	182	35,900	84,000	3,480	6,960	13,920
1,200 ft. Contour	1,000 ft. Contour	21	6,560	2,230	5,200	200	41,000	95,600	3,830	7,660	15,320
1,000 ft. Contour	Above Gauley R.	19	6,780	2,300	5,380	351	71,300	174,000	6,730	13,460	26,920
Below Gauley R.	Foot Loop Cr. Shoal	9	8,310	2,550	6,410	51	12,000	30,300	16,700	33,400	66,800
Foot Loop Cr. Shoal	Ohio R. Backwater	74	10,100	2,730	7,690	76	19,000	53,600	24,900	49,800	99,600
Total		163				937	196,200	161,300	55,640	111,280	222,560

Table No. 5—Indicated Horse-power Developed by Gauley River.

Section of River		Length, Miles.	Mean Drainage Area. Square Miles	Mimimum Discharge, sec. ft.	Assumed Dischrage for maximum Development, sec. ft.	Total Fall in Feet	Minimum Horse-power	Assumed Maximum Horse-Power	Horse-power Available from storage for		
From	To								12 months	6 months	3 months
Source	Below Williams R.	33	[a]181	38	217	2,000	1,750	10,000	......	......	......
Below Williams R.	Above Cranberry R.	17	209	44	253	280	1,130	6,520	......	......	......
Below Cranberry R.	Above Meadow R.	31	573	62	462	770	4,390	32,700	3,720	7,440	14,880
Below Meadow R.	Mouth	27	1,310	157	936	[b]480	6,930	41,300	10,400	20,800	41,600
Totals		108				3,530	14,200	90,520	14,120	28,240	56,480

[a] Total Area.

[b] Fall reduced to 300 ft. by proposed Gauley reservoir.

Table No. 6—Indicated Horse-power Developed by Tributaries of Gauley River.

Stream	Section		Length Miles	Mean Drainage Area. Sq. Mi.	Minimum Discharge. sec. ft.	Assumed Discharge for Maximum Development. sec. ft.	Total Fall, Feet	Minimum Horse-power	Assumed Maximum Development Horse-power
	From	To							
Cranberry R.	Source	Mouth	30	102[a]	5	55	2,100	241	2,650
Cherry R.	do	do	25	168[a]	8	90	2,000	368	4,140
Muddlety Cr.	do	do	22	66[a]	3	36	1,000	69	828
Hominy Cr.	do	do	18	98[a]	5	53	1,500	172	1,830
Meadow R.	do	Below Big Clear Cr.	19	163[a]	8	89	1,400	258	2,860
do	Below Big Clear Cr.	2,200 ft. Contour	18	222	10	119	300	276	3,280
do	2,200 ft. Contour	1,800 ft. Contour	11	295	14	159	400	516	5,840
do	1,800 ft. Contour	Mouth	8	350	22	189	670	1,360	11,700
Twentymile Cr.	Source	Mouth	30	75[a]	4	40	1,400	129	1,290
Totals								3,389	34,418

[a] Total Area.

Table No. 10—Indicated Horse-power Developed by the Minor Tributaries of the New-Kanawha River

Stream	Section		Length in Miles	Total Drainage Area. Sq. Mi.	Minimum Discharge. sec. ft	Assumed Discharge for Maximum Development. sec. ft.	Total Fall. Feet	Minimum Horse-power	Assumed Maximum Development Horse-power
	From	To							
East River..........	Source	Mouth	24	79	17	50	1,100	430	1,260
Indian Creek.........	do	do	34	180	40	113	1,000	920	2,600
Bluestone R.........	do	Below Mill Cr..........	23	111	33	56	1,100	836	1,420
do	Below Mill Cr..........	Above Brush Cr.........	50	[a]196	38	88	560	2,010	4,530
do	Below Brush Cr........	Mouth	11	[a]405	35	146	450	1,450	6,040
Brush Cr...........	Source	Mouth	22	69	5.9	25	1,000	136	575
Piney Cr...........	do	do	30	132	29	83	1,700	1,130	3,240
Paint Cr...........	do	do	42	121	6	66	1,400	193	2,120
Pocotaligo R.........	do	do	55	296	10	97	500	116	1,120
18 Mile Cr..........	do	do	27	60	2	20	380	18	175
13 Mile Cr..........	do	do	28	80	3	26	280	19	167
Total	....	....						7,258	23,247

[a] Mean Area.

Table No. 11—Selected Reservoir Sites—Kanawha River Basin.

Stream and Location	Catchment Area, sq. mi.	Flow Available, sec. ft.	Capacity of Reservoir, million cu.ft.	Equialent Mean Annual Flow, sec. ft.	Height of Dam. feet.	Area of Flow Line, acres
NEW RIVER—above mouth of Greenbrier River	3,600	5,750	20,300	644	135	8,000
GREENBRIER RIVER—Pocahontas County	320	460	16,300	460	177	4,700
GREENBRIER RIVER—Lewisburg	680	980	32,900	980	164	11,600
GAULEY RIVER—Fayette County	1,290	1,860	35,900	1,140	250	7,500
MEADOW RIVER—Greenbrier River	180	250	8,000	250	80	7,000
MUDDLETY CREEK—Nicholas County	60	90	3,400	90	74	2,600
ELK RIVER—Clay County	940	1,350	49.900	1,350	190	15,700

As the water-power resources of Fayette County are so great, if developed to the economic limit, a very interesting comparison of the costs of steam and water-power and the amount of coal saved by the utilization of the latter, is strikingly expressed in the following quotation from Mr. Horton, taken from pages 391-2 of the volume from which the above tables were republished:

"According to the tables which follow, the minimum amount of energy developed by the streams in West Virginia is about 350,000 horse-power, the assumed maximum is 1,163,000 horse-power. It takes from 11 to 15 tons per year of high-grade steam coal to produce one continuous horse-power in the most efficient steam engines in ordinary use. The amount of coal, based upon the lower of the above figures, necessary to produce the minimum horse-power developed by West Virginia streams is therefore 3,850,000 tons per year, to produce the maximum 12,800,000 tons per year.

"The annual cost of producing power by steam plants varies from about $25 to $150 per horse-power, depending upon the type of engine and boiler and the capacity of the plant. These figures include interest at 5 per cent., depreciation, repairs, oil, waste, labor, and fuel, using coal at $2 per ton.

"Water-power must, of course, compete with steam power derived, in general, from coal. It will therefore remain undeveloped unless it can be disposed of at less cost, except to certain customers who will pay a higher price for the convenience of obtaining electrical power.

"It costs from about $45 to $200 per horse-power measured at the turbine shaft to construct water-power plants ready to deliver electrical power. This electrical power can be sold for less in the immediate vicinity of the power plant than anywhere else as the cost of transmission is considerable and varies with the distance, voltage, and amount transmitted.

"To prevent a threatened water-power monopoly and reduce rates for electricity the province of Ontario, Canada, created a Hydro-Electric Power Commission in 1906 with full power to control plants and to buy and sell power. This commission is now operating 300 miles of 110,000-volt main transmission lines, and 180 miles of distributing lines buying current from the Ontario Power Company, a private corporation at Niagara Falls, at $9 per horse-power per annum. The rates charged the municipalities to cover cost vary from $18 to $29.50 per horse-power per annum, according to distance from Niagara Falls. The commission is supplying power at present to thirty municipalities. The city of Toronto, located approximately 90 miles from the source of power, purchases 10,000 horse-power from the commission for $18.50 per horse-power per annum for 24-hour service, which is very much less than it would cost if produced by steam plants.

"What has been done in Ontario, Canada, can be done in West Virginia or any other State. At present there is very little hydro-electric power developed in this State and the passing of laws to regulate the price of electricity for use as power or for illumination ought not be a difficult matter. The need of legislation or of a commission to regulate the charges for electricity is shown by the fact that at Buffalo electricity costs $25 per year per horse-power while at Toronto, which is three times as far from Niagara Falls, the common source of power, the price is about 26 per cent. less."

FORESTS.

A very complete description of the forests and timber conditions of the State by Counties is given by A. B. Brooks in Chapter VI, Volume V of the W. Va. Geological Survey Reports, published in 1911, the details of which, pertinent to Fayette County, on pages 137-8, as relating to the original forests, lumber industry, and the present forest conditions, are republished here as follows:

"The Original Forests.

"The topography of Fayette is such as to promote the growth of valuable forests. Originally the low and fertile lands of the Gauley and of that portion of the Great Kanawha within the county, were characterized by the abundance of yellow poplar, black and white walnut, white and red oaks, sweet buckeye, bass-wood, cucumber and white ash, as well as the less valuable sweet gum, sycamore, river birch, honey locust, and others. On the clays of the higher areas such species as maples, white oak and beech predominated, with fringes of hemlock along the water courses and with scattered clumps of pitch pine and scrub pine growing on dry ridges and along the sandstone outcrops.

"The Lumber Industry.

"Some of the best yellow poplar, black walnut and other timber growing along the Great Kanawha and the Gauley Rivers was cut and rafted out about 50 years ago. The New River is too rapid for even the successful drifting of single logs and, as there was no other means of transportation then, the bulk of the timber in the interior remained until a later date. A large number of staves were cut in a wasteful manner on Laurel Creek about 35 years ago and several small steam and water mills were in operation before that time. Two sash sawmills, at least, existed in the county as early as 1835. Timber cutting on a large scale for commercial use did not begin until about 1885. The industry has continued without interruption and at an increasing rate until the present day. The greater part of the timber so far taken has been sawed by portable stave and lumber mills located throughout the county. These have delivered their lumber over branch railroads, wooden tram roads and, by means of wagons, over country roads, to the various stations along the Chesapeake and Ohio Railroad, and, more recently, to Belva, Gauley Bridge and other stations on the Gauley branch.

"Large requisitions have been made upon the timber by the 150, or more, coal companies operating within the county. The quantity of timber used in mining, through a long series of years, for posts, caps, headers, ties, tipples, and buildings, is enormous. In the judgment of those men best acquainted with the present situation the time is near when the scarcity of both timber and water will become alarming if, indeed, it is not already so. A number of coal companies, however, are taking steps to preserve the remnant of less valuable but rapid-growing timbers still standing in the extensive cut-over forests. An enterprising company owning property on Loop Creek has built an immense dam near the head of that stream and is catching the run-off water of early freshets for their use in mining operations.

"The present lumber industry embraces the operations of 2 large band mills located within the county and a third located near the eastern line in Greenbrier County, together with the smaller operations of about 25 portable mills. These have a combined capacity of not less than 250,000 feet per day. The large mills are engaged in the removal of timber from the remaining virgin tracts and the small mills are cutting wherever a few thousand feet of timber can be brought together.

"The Present Forest Conditions.

"There is, perhaps, 10 per cent. of cleared land in the county. The remaining 446,000 acres are in forest. Only about 53,000 acres, however, are yet in virgin growth. The balance is cut-over and woodlot forest owned by coal and lumber companies and by farmers. It is estimated that there is an average stand of about 2,500 feet per acre of the less valuable kinds of timber such as black gum, beech, sugar, and red maple, birch, etc., yet remaining on the cut-over and woodlot land, but that at least 80 per cent. of the value of the original forest has been removed. Areas aggregating 200,000 acres, or more, of cut-over lands lie chiefly in the southern and western parts of the county and are largely owned by coal companies. The principal virgin forest areas lie in the region of Big Sewell Mountain, in the eastern part of the county, and, farther north, along the Meadow River."

AREAS SUITABLE FOR REFORESTATION.

As shown by the above data, only about 10 per cent. of the area of Fayette is cleared land and probably 75 per cent. is too rough, and steep and stony ever to be successfully utilized for agricultural purposes, tillage, except in the plateau regions, being mostly confined to narrow strips along the valley floors, with now and then a small cove clearing. Hence, there is a large acreage that would be otherwise unproductive, if it were not made to produce timber by a systematic process of reforestation. By far the greater portion of this rough land is owned by large coal and lumber companies and wealthy non-resident individuals, a feature that should simplify the problem of reforestation, in that a plan of cooperation could be more readily established in the employment of a force of forest rangers, the expense being assessed proportional to the number of acres owned. In addition to looking after the protection of young timber from fires, the rangers could also tend to the planting of young trees and direct the cutting of the mature timber.

APPENDIX "A."

SOME REVISIONS IN CORRELATION FOR MEMBERS OF KANAWHA GROUP IN MINGO COUNTY, WEST VIRGINIA

In Chapter VI, pages 246 and 249, under the description of the Dingess Coal and the Seth Limestone, the belief was expressed that the Dingess Coal[1] at Dingess, Mingo County, correlated with the Williamson Coal[2] of Williamson, same County, and that the marine limestone exposure, 20 to 30 feet below the Dingess Coal, on the north bank of Twelvepole Creek, ¼ mile southeast of Dingess Station, at an elevation of 990′ B., correlated with the Seth Limestone[3], instead of the Dingess Limestone[4] as the latter is represented at its type locality in the bed of Twelvepole Creek, 1.1 miles southeast of Dingess Station. This conclusion had been reached from a more detailed knowledge of the marine fossiliferous horizons of the Kanawha Group acquired while gathering data in the field for reports on other counties in southern West Virginia since the publication in 1914 of the Report last cited. The authors of the Report in question were greatly handicapped by lack of time for gathering the field notes, owing to the difficulty of tracing coal beds and other members throughout the largely forested area prevailing in Logan and Mingo Counties. The author of this Report, who is also senior author of the Logan-Mingo Report, had never been entirely satisfied with the correlations of the members of this portion of the rock column as published for the region lying between Dingess and Naugatuck in Mingo County, the most of the field notes for this locality having been gathered by the junior author, D. B. Reger. The author recently visited the Dingess and Hale regions of Mingo and established the fact that the Dingess Limestone belong 25 to 40 feet above the Dingess Coal at the type locality of both members, instead of 20 to 30 feet below the latter, thus making the Dingess Coal one and the same bed as the Williamson. The true stratigraphic succession along Twelvepole Creek in the Dingess region for this portion of the rock column is shown in descending order by the following section, the serial numbers for the coal openings used being the same as given for the corresponding openings in the Logan-Mingo Report heretofore mentioned:

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[1] Logan-Mingo Report, W. Va. Geol. Survey, pp. 163-5; 1914.

[2] Loc. cit., pp. 166-8.

[3] C. E. Krebs, Boone County Report, W. Va. Geol. Survey, p. 155; 1915.

[4] Logan-Mingo Report, W. Va. Geol. Survey, p. 165; 1914.

Revised Dingess, Mingo County, Section.

				Thickness. Feet.	Total. Feet.	
Coal	1′	8″				
Slate, black	1	0				
Coal, blocky	1	0				
Coal, slaty	1	6				
Coal, semi-splint	1	6	(Mine No. 283)			
Shale, gray, 3″ to	0	3				
Coal	0	2				
Shale, gray	0	4				
Slate, bony	0	1				
Coal, semi-splint	3	5	Chilton Coal	11	11	11′
Shale and concealed in steep slope				59	70	
Sandstone, shaly, **Hernshaw**				30	100	
Shale, gray, 0″ to				3	103	
Coal	0′	8″				
Shale, gray	0	2				
Coal	0	4	(Opening No. 380)			
Shale, gray	3	11				
Coal, semi-splint	2	11	Hernshaw	8	111	100′
Fire clay shale				10	121	
Sandstone, **Williamson**				30.9	151.9	
Shale, **Dingess**, gray to black, siliceous and limy, with **limestone lenses, Dingess**, and marine fossil shells abundant, 20′ to				30	181.9	70.9′
Sandstone, **Dingess**, lenticular, 5′ to				25	206.9	
Draw slate				1	207.9	
Coal, gas	1′	3½″	(Mine No. 377)			
Bone	0	1½	Williamson,			
Coal, splinty	1	8	"Dingess"	3.1	211	29.1′
Shale				4	215	
Sandstone, **Upper Cedar Grove**, 10′ to				20	235	

	Thickness. Feet.	Total. Feet.	
Shale, siliceous, iron ore nodules abundant, 3′ to	5	240	
Limestone, Seth, ferriferous, marine fossil shells	1	241	30′

In the foregoing section it will readily be seen that the "Dingess" Coal belongs from a few inches to 30 feet below the marine fossiliferous Dingess Shale and Limestone and in this locality about 30 feet above the Seth Limestone, or at the horizon of the Williamson bed. A new member, the **Dingess Sandstone,** makes its appearance here and southward on Laurel Creek, but it is quite lenticular in its occurrence, frequently thinning down to less than 5 feet in exposures along the Norfolk & Western Railway northwest from Dingess.

The elimination of the Dingess Coal as a separate and distinct bed from the Williamson calls for a slight revision of the General Section of the Pottsville Series for the Southern Half of West Virginia, published on pages 100-111, inclusive, of this Report, but only in that portion given on page 102 below the Hernshaw Coal, which should be revised to read as follows:

	Thickness. Feet.	Total. Feet.	
Coal, Hernshaw, multiple-bedded, mined on Lens Creek, Kanawha County, where it is known as the **"Black Band"** seam	0 to 4	700	
Shale	5 to 10	710	
Sandstone, **Williamson**	20 to 30	740	
Shale and Limestone, Dingess, gray to black, limy and siliceous shale with limestone lenses, and marine fossil shells abundant, widely persistent in Kanawha, Fayette, Nicholas, Boone, Logan, and Mingo Counties and in State of Kentucky	20 to 30	770	
Sandstone, Dingess, lenticular, local to Mingo County	0 to 22	792	
Coal, Williamson, multiple-bedded, splinty, mined commercially at Williamson and Dingess, Mingo County, same as "Dingess" bed of Logan-Mingo Report of W. Va. Geological Survey	1 to 8	800	100′
Fire clay, impure, and shale	1 to 5	805	
Sandstone, Upper Cedar Grove	10 to 40	845	

	Thickness. Feet.	Total. Feet.	
Shales, dark-gray, siliceous, with iron ore nodules, holding **marine fossiliferous Seth Limestone** of Boone County, the latter being widely persistent in Mingo, Kanawha, and Fayette Counties......................	20 to 50	895	
Coal, Cedar Grove, multiple-bedded, splinty; when normal, the base of upper bench is hard and splinty, and reverse is true of lower bench; mined extensively in the Kanawha Valley; same as **Island Creek** seam of Logan, the upper bench being the **Red Jacket** or **Upper Thacker** bed of Mingo County	2 to 5	900	100′

It will be noted above that the Naugatuck Sandstone has also been eliminated from the general section as published on page 102 in the belief that at its type locality in Mingo County it represents the Williamson ledge.

From the foregoing data it follows that the approximate minable area of the Dingess Coal bed, as shown on page 466 of the Logan-Mingo Report, should be added to that exhibited for the Williamson Coal, published on page 487 of the same Report. Likewise, the available tonnage of the former bed, given on page 486, should be added to the results given for the Williamson seam on page 511 of the same Report.

The erroneous assumption that the two marine fossiliferous limestone exposures on Twelvepole Creek, southeast of Dingess, represented the Dingess Limestone and Shale, resulted in some confusion in the correlations of the bed mined at Openings Nos. 380-4 and 62A, as published for the Dingess-Hale region on pages 478-480 of the Logan-Mingo Report, these all being on the Hernshaw Coal instead of the Dingess bed. The same assumption led to the belief that the **Warfield Fault** accounted for the difference in elevation of the two limestone exposures heretofore mentioned, but careful investigations of the sandstone ledges cropping high up on the mountainsides, on this December, 1918, trip, failed to reveal any marked displacement of the rock strata southward and southeastward for 2 miles from Dingess, a feature that leads to the conclusion that the Warfield Fault does not extend northeastward from Tug River to the Dingess locality.

APPENDIX “B.”

LEVELS ABOVE MEAN TIDE.

RAILROAD LEVELS.

THE CHESAPEAKE & OHIO RAILROAD.

Main Line.

Distances from Ft. Monroe	STATIONS.	County	Elevation
357.0	Hinton	Summers	1378
360.0	Barksdale	Summers	....
362.0	Brooks	Summers	1345
366.1	Sandstone	Summers	1299
369.6	Meadow Creek	Summers	1276
374.3	Glade	Fayette	1245
378.7	Quinnimont	Fayette	1205
379.9	Prince	Fayette	1203
380.8	XN Cabin	Fayette	1203
383.1	McKendree	Fayette	1135
385.0	Thayer	Fayette	1116
387.0	Alaska	Fayette	....
387.8	Claremont	Fayette	....
389.1	Stonecliff	Fayette	1077
391.8	Thurmond	Fayette	1070
392.2	Dimmock	Fayette	....
392.4	Rush Run	Fayette	....
393.2	Beury	Fayette	....
394.0	Central	Fayette	....
394.5	Fire Creek	Fayette	1038
395.2	Pennbrook	Fayette	....
396.4	East Sewell	Fayette	1012
397.6	Sewell	Fayette	....
399.3	Caperton	Fayette	....
400.4	Keeney Creek	Fayette	....
401.6	Nuttall	Fayette	954
404.3	Fayette	Fayette	909
404.9	Newlyn	Fayette	....
405.5	Michigan	Fayette	....
405.6	Elmo	Fayette	....
406.8	Sunnyside	Fayette	....
407.6	Gaymont	Fayette	....
408.6	Hawks Nest	Fayette	837
408.9	MacDougal	Fayette	836
410.8	Cotton Hill	Fayette	796
415.2	Gauley	Fayette	723

Distances from Ft. Monroe	STATIONS.	County	Elevation
415.9	Old Gauley	Fayette	....
417.9	Kanawha Falls	Fayette	677
421.6	Deepwater	Fayette	656
422.6	Mt. Carbon	Fayette	647
425.1	St. Clair	Fayette	....
425.3	Eagle	Fayette	650
425.9	Ellswater	Fayette	...
426.6	Crescent	Fayette	....
427.5	Montgomery	Fayette	645
428.9	Morris Creek Junction	Kanawha	....
429.0	Consolidated	Kanawha	....
429.6	Handley	Kanawha	639
431.7	Paint Creek Junction	Kanawha	629
432.8	Hansford	Kanawha	....
433.5	Crown Hill	Kanawha	....
434.1	Belmont	Kanawha	..
435.08	Black Cat	Kanawha	...
435.6	East Bank	Kanawha	....
437.5	Coalburg	Kanawha	632
438.2	Cabin Creek Junction	Kanawha	630

Laurel Creek Branch.

Distances from Quinnimont	STATIONS.	County	Elevation
0.0	Quinnimont	Fayette	1205
0.8	Coke Ovens	Fayette	...
2.9	Robins	Fayette	1580
4.0	Laurel	Fayette	1800
4.5	Big Q.	Fayette	....
5.1	Brownwood	Fayette	....
5.4	Hemlock Hollow	Fayette	2015

Loup Creek Branch.

Distances from Thurmond	STATIONS	County	Elevation
0.0	Thurmond	Fayette	1070
0.3	South Side Junction	Fayette	....
3.5	Harvey	Fayette	....
5.7	Red Star	Fayette	1270
6.9	Glen Jean	Fayette	....
7.5	Whiteoak Junction	Fayette	1656
7.8	Sun	Fayette	...
8.8	Derryhale	Fayette	..
9.5	Dunloup	Fayette	...
9.8	Turkey Knob	Fayette	..
10.2	Macdonald	Fayette	1705

Whiteoak Branch.

Distances from W. O. Junc.	STATIONS.	County	Elevation
0.0	Whiteoak Junction.............	Fayette	....
1.2	Wingrove	Fayette	....
2.2	Scarbro	Fayette	....
2.4	Whipple Junction..............	Fayette	....
3.6	Carlisle	Fayette	....
5.8	Oak Hill	Fayette	....
8.2	Parral (Summerlee)	Fayette	....
9.9	Stuart (Lochgelly)	Fayette	....

Rend Branch (Arbuckle Creek Branch).

Distances from Thurmond	STATIONS.	County	Elevation
0.0	Thurmond	Fayette	1070
0.5	Ballahack	Fayette	1070
3.5	Minden	Fayette	1600

South Side Branch.

Distances from Hawks Nest	STATIONS.	County	Elevation
0.0	Hawks Nest	Fayette	837
0.5	MacDougal	Fayette	836
2.0	Whitney	Fayette	843
4.0	South Fayette	Fayette	892
7.0	MJ Cabin	Fayette	....
8.0	Brown	Fayette	967
12.0	Cunard	Fayette	1010
14.0	Red Ash.......................	Fayette	1028
17.0	Rush Run......................	Fayette	....
18.0	Thurmond	Fayette	1070

Keeney Creek Branch.

Distances from Keeney Creek	STATIONS.	County	Elevation
0.0	Keeney Creek	Fayette	....
3.0	Boone	Fayette	1662
5.0	Masters	Fayette	....
7.0	Lookout	Fayette	2173

Mill Creek (Hawks Nest) Branch.

Distances from Hawks Nest	STATIONS.	County	Elevation
0.0	Hawks Nest	Fayette	837
4.0	Ansted	Fayette	1463

Gauley Branch.

Distances from Gauley	STATIONS.	County	Elevation
0.0	Gauley	Fayette	733
1.4	K. & M. Junction	Fayette	673
7.3	Belva	Fayette	711
7.8	Open Fork Junction	Nicholas	....
11.2	Carterboro (Bentree)	Nicholas	....
7.8	Open Fork Junction	Nicholas	....
8.3	Bells Creek	Nicholas	....
12.7	Vaughan	Nicholas	803
14.5	Greendale	Nicholas	949

Powellton Branch.

Distances from Mt. Carbon	STATIONS.	County	Elevation
0.0	Mt. Carbon	Fayette	644
2.0	Cardiff	Fayette	733
5.0	Powellton	Fayette	914

Paint Creek Branch.

Distances from Paint Creek Junc.	STATIONS.	County	Elevation
0.0	Paint Creek Junction	Kanawha	629
1.5	Scale Yard	Kanawha	....
3.6	Mucklow	Kanawha	662
4.7	Wacomah	Kanawha	...
5.9	Standard	Kanawha	707
6.0	Bedford	Kanawha	....
7.5	Detroit	Kanawha	....
8.9	Morton	Kanawha	766
10.0	Nuckolls	Kanawha	....
11.0	Tomsburg	Kanawha	....
12.0	Greencastle	Kanawha	846
12.9	Imperial Junction	Kanawha	....
13.0	Burnwell	Kanawha	....
12.9	Imperial Junction	Kanawha	....
14.8	Hickory Camp	Fayette	929
15.5	Mahan	Fayette	966

THE KANAWHA & MICHIGAN RAILWAY.

Main Line.

Distances from Toledo	STATIONS.	County	Elevation
346.6	London	Kanawha	631.0
349.8	Cannelton	Kanawha	632.0
350.4	Smithers	Fayette	632.0
351.2	Longacre	Fayette	.....
352.4	Harewood	Fayette	.....
352.8	Boomer	Fayette	651.5
355.5	Falls View...................	Fayette	.....
359.1	Glen Ferris..................	Fayette	657.3
360.6	Gauley Bridge	Fayette	671.4

THE VIRGINIAN RAILWAY.

Main Line.

Distances from Sewalls Point	STATIONS.	County	Elevation
417.2	Cirtsville	Fayette	1703.7
419.0	Herberton	Fayette	1638.1
422.5	Lively	Fayette	1615.0
425.3	Dothan	Fayette	1783.1
427.7	Silver Gap	Fayette	1880.2
428.7	Bishop	Fayette	1831.5
434.2	Hamilton	Fayette	1883.7
437.5	Page	Fayette	1109.7
441.4	Robson	Fayette	900.0
446.0	Deepwater	Fayette	652.2

SEWELL VALLEY RAILROAD.

Distances from Meadow Creek	STATIONS	Elevation
0.0	Meadow Creek............................	1273
2.6	Beurytown Mine..........................	....
2.7	Beurytown	1556
4.6	Claypool Mine...........................	....
4.9	Claypool	1868
5.5	Tina	....
6.0	Naylor Switchback.......................	....
6.5	Dilly Siding............................	....
7.3	Camp Seven Switchback...................	2325
7.3	Meadow Creek Switchback.................	....
8.5	Meadow Bridge...........................	2420
8.6	Meadow Bridge Mine......................	....
8.7	Hawley	2435
8.8	Hawley Mine Siding......................	....

Distances from Meadow Creek	STATIONS.	Elevation
10.6	Arthurs	2615
11.7	Teays Siding	....
11.8	Springdale	2770
11.9	Lowerys Siding	....
13.9	Youngs	2675
16.2	Bellwood	2505
16.3	Wilt Siding	....
16.4	Griffith Siding	...
16.5	Sevy	2465
17.6	Sims	2419
19.7	Rainelle	2419
20.1	Rainelle Junction	2395
21.9	Dwyer	2395
22.0	Green Siding	....
24.7	Surbaugh	2368
27.6	Honeydew	2325
28.0	Cruikshanks Farm	....
28.7	Crusher Siding	....
30.6	Burdette Creek	2268
....	Dry Creek	1976
37.0	Russellville	1904
40.0	Nallen	1892

The above levels on the Sewell Valley Railroad were sent the Survey by T. W. Raine, President, under date of September 30, 1918.

MANNS CREEK RAILROAD.

Under date of October 16, 1918, the following letter was received from Geo. Bean, General Manager of the Babcock Coal & Coke Company, which owns and operates the Manns Creek Railroad:

"We have your favor of September 15th to our Sewell office, asking for levels of the Manns Creek Railroad, and we beg to advise you that our road is a narrow gauge and leaves the C. & O. Railroad at Sewell, which is an elevation of about 800 feet. We come up the mountain to what we call the Junction, a distance of five miles, where the elevation is 1612 feet, and from this Junction to Clifftop, a distance of 3[illegible] miles, and the elevation at Clifftop is 2282 feet. This line from Sewell to Clifftop runs in a northeasterly direction. From what we call the Junction we have our Lumber Railroad running out a distance of 3 miles to Landisburg, a southeasterly direction, where the elevation is 2[illegible]49 feet. From Landisburg we have about 20 miles of Logging Railroad running back in the mountains, where the elevation at some points is 3000 feet.

"Sewell, Clifftop, and Landisburg are the only stations we maintain on our entire system. Our Coal Mines are located at Clifftop, Coke Ovens at Sewell, and our Double-Band Sawmill and Planing Mill at Landisburg."

KANAWHA, GLEN JEAN & EASTERN RAILROAD.

Main Line.

Distances from Glen Jean	STATIONS.	County	Elevation
0.00	Glen Jean	Fayette	1600.0
0.94	Sun	Fayette	1626.5
1.12	Sunset	Fayette	1626.5
1.74	Derryhale	Fayette	1635.5
2.25	Dunloup	Fayette	1658.4
2.74	Turkey Knob	Fayette	1685.5
3.08	Macdonald	Fayette	1686.7
3.29	*Sugar Creek Junction	Fayette	1696.5
3.68	Mount Hope	Fayette	1709.7
4.32	Kilsyth	Fayette	1723.0
5.02	Price Hill	Raleigh	1785.0
6.70	Oswald	Raleigh	1911.0
7.34	Graham	Raleigh	1992.0
7.72	Tamroy	Raleigh	2050.0
8.00	End of track	Raleigh	2086.88

Sugar Creek Branch.

Distances from *Sugar Creek Junc.	STATIONS.	County	Elevation
0.00	Sugar Creek Junction	Fayette	1696.5
0.23	Mount Hope	Fayette	1696.5
2.83	Tunnel Siding	Fayette	1843.0
3.83	Big Fork	Fayette	1720.0
4.61	O'Neal	Fayette	1675.0
5.09	Millers Camp	Fayette	1635.8
6.14	Pax	Fayette	1633.5

U. S. GEOLOGICAL SURVEY* LEVELS

BECKLEY QUADRANGLE.

From Packs east along highway and Chesapeake & Ohio Ry. to Thurmond.

	Feet.
Packs Branch, 0.3 mile east of, on sharp curve to south, on south abutment of culvert over small stream; chiseled cross, marked "1703"	1,702.07
Packs Branch, 1 mile east of, 0.3 mile west of Upper Packs Branch School, 150 feet south of road, 40 feet south of Packs Branch, 80 feet north of railroad, in large sandstone rock; bronze tablet stamped "1768"	1,767.053
Mount Hope, 2.2 miles west of, 60 feet west of end of tunnel, 7 feet south of track; chiseled cross on ledge of rock, marked "1865"	1,864.41
Mount Hope, 0.9 mile west of, 250 feet west of head-block of switch, on curve to south, 50 feet south of road, 15 feet north of track; chiseled cross on rock, marked "1727"	1,726.01
Mount Hope, 0.1 mile north of, 100 feet south of Kanawha, Glen Jean & Eastern R. R. track, 30 feet east of road junction, 10 feet south of Sugar Creek Mining Co.'s store, in sandstone ledge; bronze tablet stamped "1708"	1,707.656
Mount Hope, Bradley's drug store, in the sidewalk in front; a brass plate stamped "1738"	1,738.094
Mount Hope, 2.4 miles north of, 0.3 mile south of Sun, 800 feet north of mile-post T 8, on curve to west, 10 feet west of railway; chiseled cross on rock, marked "1652"	1,651.09
Glen Jean, 0.1 mile east of station, on south abutment of bridge of Chesapeake & Ohio Ry., east end; bronze tablet stamped "1605"	1,603.665
Harvey, 125 feet northwest of railroad telegraph office, 150 feet west of road crossing, on curve to north, in bluff north of railroad tracks; chiseled cross on rocks, marked "1571"	1,569.69
Harvey, 1 mile east of, on sharp curve to south, 7 feet north of track, 0.1 mile east of mile-post T 4; chiseled cross on rock, marked "1486"	1,485.39
Harvey, 1.7 miles east of, 0.2 mile east of mouth of Hamilton Branch, 75 feet north of track, on north bank of Dunloup Creek, in sandstone ledge; bronze tablet stamped "1404".	1,402.735
Harvey, 3.2 miles east of, 0.7 mile east of Meadow Forks, 800 feet east of mile-post T 2, 25 feet south of track, in curve to south; chiseled cross on rock, marked "1249"	1,247.82
Thomas, 0.25 mile east of, 700 feet east of mile-post T 1, 10 feet south of track, on sharp curve to north; chiseled cross on rock, marked "1113"	1,111.94
Thurmond, in north end of east abutment of bridge over New River; aluminum tablet stamped "1068"	1,067.457

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*From Bulletin 632, U. S. Geological Survey, 1916.

From Quinnimont west along Chesapeake & Ohio Ry. to McCreery.

	Feet.
Quinnimont, 46 feet south of station, in top of north abutment at west side of railroad bridge; aluminum tablet stamped "1200"	1,199.058
Prince, in front of station; top of rail (1912)	1,192.1
Stanaford, 5 miles northeast of, 0.3 mile east of Terry Junction, on north end of east abutment of bridge 10; chiseled cross, marked "1190"	1,188.35
McCreery, in front of station; top of rail	1,197.8

Near Sewell.

Sewell, 1 mile east of, south edge of track; chisel point on boulder, chiseled "1437 U. S"	1,436.47
Sewell, on bluff above, at road crossing of Sewell Valley Lumber Co.'s railroad and Springdale wagon road; chisel point on boulder, chiseled "1240 U. S."	1,239.95
Sewell, 0.6 mile south of, 170 feet south of mile-post "Cin. 268," in foundation of semaphore-pole; aluminum tablet stamped "1011" (description as published in Bull. 399, p. 11, is in error)	1,010.113

ECCLES QUADRANGLE.

From point near Clear Creek east along highway and Chesapeake & Ohio Ry. to Pax.

Clear Creek, 4.1 miles east of, on divide between Toney Fork and Willis Branch, on boundary line between Raleigh and Fayette Counties, 100 feet south of road, on sandstone rock; bronze tablet stamped "2447"	2,446.538
Pax, 1.8 miles west of station, on road leading up Willis Branch, 50 feet south of road junction, 40 feet north of Willis Branch, about 200 feet east of small stream, 10 feet east of road; chiseled cross on rock, marked "1729".	1,727.89
Pax, 0.8 mile north of station, 10 feet west of track, at south end of cut; cross chiseled in rock, marked "1628".	1,628.16
Pax, 900 feet north of station, 60 feet west of track, in sandstone rock; bronze tablet stamped "1639"	1,638.770
Pax, 0.7 mile east of, 0.2 mile west of head-block of switch on main track, 30 feet south of main track, in mouth of small hollow; chiseled cross on rock, marked "1636"	1,635.24

FAYETTEVILLE 15′ (Kanawha Falls 30′) QUADRANGLE.

Caperton, in front of station; top of rail	991.0
Keeney Creek, in front of sign-board; top of rail	968.8
Nuttall (Nuttallburg post-office), 0.56 mile east of, north of track, in top of east abutment to railroad culvert; aluminum tablet stamped "959"	958.091
Nuttall, in front of station; top of rail	949.5
Nuttall, 1.47 miles west of, 200 feet west of mile-post "Cin. 262," west of track, in face of large rock; aluminum tablet stamped "924"	923.546
Fayette, in front of station; top of rail	899.9

	Feet.
Newlyn, in front of sign-board; top of rail	880.9
Elmo, in front of sign-board; top of rail	870.6
Fayette, 1.81 miles west of, 200 feet west of mile-post "Cin. 259" north of track, in face of large rock; aluminum tablet stamped "868"	867.085
Sunnyside, in front of sign-board; top of rail	849.7
Hawks Nest, in front of station; top of rail	834.5
Hawks Nest, 0.22 mile west of, south of track, in top of abutment at east end of railroad bridge over New River; aluminum tablet stamped "834"	832.873
Cotton Hill, in front of station; top of rail	794.7
Cotton Hill, 1.14 miles west of, 150 feet south of mile-post "Cin. 253," 7 feet east of track, in top of large rock; aluminum tablet stamped "771"	770.240
Gauley, in front of station; top of rail	720.0
Gauley, 400 feet north of Chesapeake & Ohio station, in top of south abutment at west side of bridge over New River; aluminum tablet stamped "712"	711.842
Gauley Bridge Station, on Kanawha & Michigan Ry., at top step of wing-wall in south face of abutment at west end of bridge over highway; aluminum tablet stamped "677 Knwa" (old bench mark—elevation given in 21st Annual Report, 677.086)	676.543
Glen Ferris, in front of station; top of rail	673.3
Kanawha Falls, 180 feet south of flag station of Kanawha & Michigan Ry., 200 feet north of railway crossing, west of track, nearly opposite house of T. W. Farley, in face of rock at base of cliff; bronze tablet stamped "668 Knwa" (old bench mark—elevation given in 21st Annual Report, 667.121)	666.540
Falls View, in front of station; top of rail	652.9

From Lock 2 east on Kanawha & Michigan Ry. to Gauley.

Harewood, 600 feet east of coal tipple, in top of coping at north end of Kanawha & Michigan Ry. culvert; aluminum bolt stamped "638 Knwa"	637.328

From Gauley north along Chesapeake & Ohio R. R. to point 3 miles north of Belva.

Vanetta, 0.04 mile south of post-office, 0.97 mile north of Gauley Bridge, 10 feet north of railroad, 1,000 feet east of Vanetta coal tipple, 400 feet east of Sand (Dan?) Branch, on large sandstone boulder; chiseled square, marked "679"	680.60
Vanetta, in front of post-office; top of rail	681.5
Gamoca, 0.32 mile south of post-office, 1.08 miles north of Vanetta post-office, 10 feet south of railroad, on south bank of Gauley River opposite mouth of Big Creek, 2,000 feet west of mile-post marked "G-4-G-11," in sandstone outcrop; aluminum tablet stamped "684"	685.257
Gamoca, in front of post-office; top of rail	685.8
Wyndal, 1.55 miles south of post-office, 1 mile north of Gamoca post-office, 10 feet south of railroad, 1,000 west of mile-post marked "G-5-G-10," on shaly sandstone outcrop; chiseled square, marked "688"	689.64

	Feet.
Wyndal, in front of post-office; top of rail	695.4
Belva, 0.4 mile south of station, 0.6 mile north of Wyndal post-office, in south face of capstone on east end of south abutment of bridge across Gauley River; shank of old bronze tablet (old bench mark which was stamped "711")	710.006
Belva, in front of station; top of rail	706.9
Belva, 2.6 miles northeast of, 20 feet north of railroad, 40 feet south of creek, 220 feet east of point opposite mouth of Bells Creek, on large sandstone boulder; chiseled square, marked "700"	701.71

From Belva along Gauley River to Little Elk Creek[1].

Belva, 4.8 miles east of, 0.5 mile northeast of mouth of Elk Creek, 15 feet northwest of road, in ledge of rock; aluminum bolt stamped "752 Knwa"	751.540

From Fayette north along highway to Lockwood.

Nuttallburg, 1.47 miles west of, 220 feet west of mile-post "Cin.-262," south of track, in very high boulder; aluminum tablet stamped "924"	923.546
Lansing, 0.36 mile southwest of post-office, east of long overhanging outcrop, 75 feet west of balanced boulder south of road, 2 feet above grade, in sandstone outcrop north of road; aluminum tablet stamped "1583"	1,582.345
Lansing, 0.77 mile northeast of post-office, 60 feet south of wooden culvert over branch where road turns sharply to east, halfway down hill to Mill Creek, west of road, on sandstone outcrop; chisel cut marked "1717"	1,716.23
Lansing, 1.5 miles northeast of, 200 feet west of house north of road, on south edge of road on sandstone ledge; chisel cut marked "1766"	1,765.78
Lansing, 2.2 miles northeast of, 0.17 mile east of pine grove, at slight hollow to south, 50 feet west of bend to north, south of road, in sandstone outcrop; aluminum tablet stamped "1814"	1,813.195
Hico, 1.5 miles southwest of, 40 feet east of road north leading to Thomas Kinkaid's place, 100 feet west of wooden bridge over branch, 140 feet east of branch, north of road, on sandstone outcrop; chiseled square, marked "1885"	1,884.84
Hico, 0.7 mile west of post-office, 175 feet east of Timber Lake Schoolhouse, at south edge of road, on Mill Creek, in sandstone outcrop; aluminum tablet stamped "1955"	1,954.079
Deitz, 3.76 miles southwest of, 300 feet east of turnpike road, north of road, on sandstone outcrop; chiseled square, marked "2034"	2,032.98
Deitz, 3.76 miles southwest of, 300 feet east of turnpike road, below top of hill, ground facing north and opposite side of Osborn Creek to church and school, 130 feet east of house on west side of road, 10 feet west of slight hollow, under white walnut tree, in sandstone boulder; aluminum tablet stamped "1798"	1,797.058

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[1] Part of old line to Nicholas Quadrangle.

	Feet.
Deitz, 0.3 mile west of post-office, 150 feet west of branch, 90 feet north of sharp turn to north where road approaches hollow, west of road, on sandstone ledge; chiseled square marked "1814"	1,813.66
Ramsey, 0.56 mile north of, 30 feet east of Laurel Creek, 600 feet north of Gwinn Branch, opposite side of creek from house, 12 feet west of road, in sandstone boulder; aluminum tablet stamped "1427"	1,426.528
Lucas, 500 feet northwest of post-office, on north side of Gauley River, 130 feet west of Wood's ferry landing, north of road in huge conglomerate boulder; aluminum tablet stamped "1006"	1,005.058
Albion, 1.12 miles east of, 125 feet northeast of Pinegrove Schoolhouse, 150 feet southwest of wooden bridge over branch, north of road, 1 foot above ground, in sandstone outcrop; aluminum tablet stamped "1306"	1,305.023

From Cotton Hill south along highway to point on Loup Creek 2 miles west of Wriston.

Cotton Hill, 1.14 miles west of, 150 feet south of mile-post "Cin. 253," 7 feet east of track, in top of large rock; aluminum tablet stamped "771"	770.240
Beckwith, 0.88 mile west of post-office, 4.08 miles east of Dempsey, on north edge of county road, 150 feet west of fork of road to south, nearly opposite deep hollow and schoolhouse, in solid sandstone boulder; aluminum tablet stamped "1223"	1,221.928
Dempsey, 1.8 miles east of, opposite deep hollow, on north edge of county road, near top of bank, on sandstone outcrop; chiseled square, marked "1321"	1,320.75
Dempsey, 0.98 mile east of post-office, 10 feet northwest of county road, 50 feet northwest of gristmill owned by W. H. Nugen, 20 feet south of blacksmith shop, 200 feet east of Laurel Hill Schoolhouse, in sandstone outcrop; aluminum tablet stamped "1325"	1,324.582
Dempsey, at fork of road to south up Left Fork of Laurel Creek, 200 feet east of Dogged Chapel, on solid sandstone boulder; chiseled square, marked "1345"	1,344.48
Dempsey, 2.03 miles west of, at north edge of county road, 360 feet from foot of hill on Laurel Creek side, in solid sandstone boulder; aluminum tablet stamped "1531"	1,530.264
Wriston, 0.73 mile east of post-office, at south edge of county road, opposite and 300 feet from residence of B. W. Settle, on sandstone outcrop; chiseled square, marked "1535"	1,534.69
Wriston, 0.9 mile west of post-office, 4.05 miles southeast of Kincaid post-office, 20 feet north of Deepwater R. R. track, 400 feet south of county road, at east end of rock cut, 600 feet southeast from residence of K. Kincaid, 1,600 feet east of mile-post, "DW-13," in sandstone boulder; aluminum tablet stamped "1409"	1,408.031

Near Robson from Mile-posts 7 to 4 on Virginian Ry.[1]

	Feet.
Robson, 0.63 mile south of post-office, just south of Underwood's store, 60 feet south of road crossing, 700 feet north of mile-post "DW-6," on top stone at west corner of north abutment of bridge across Loop Creek; chiseled square, marked "1000"	999.13
Robson, 1.08 miles north of post-office, 150 feet southwest of Virginian Ry. track, 300 feet west of station, 1,200 feet east of mile-post "DW-4," in flat sandstone boulder; aluminum tablet stamped "874"	872.963

From Deepwater east to Kanawha Falls.

Kanawha Falls, 3,000 feet southwest of station, 500 feet west of hollow, on south end of stone culvert; chiseled square, marked "659"	658.18

MEADOW CREEK QUADRANGLE.

From Meadow Creek northeast along road up Meadow Creek to Springdale, thence northwest to Sewell.

Meadow Creek, 0.2 mile west of, in top of west abutment at north side of railroad bridge; aluminum tablet stamped "1269"	1,270.126
Meadow Creek, 1 mile northeast of, 10 feet east of track; chisel point on ledge, chiseled "1400 U. S."	1,399.93
Beurytown, 0.3 mile northeast of, 20 feet west of track; spike in base of telephone-pole, scribed "1556 U. S."	1,556.17
Tina, 0.6 mile southwest of, south edge of track; chisel point on boulder, chiseled "1776 U. S.'	1,775.66
Tina, 0.4 mile southwest of, 20 feet west of track, at road crossing, 150 feet north of schoolhouse, 150 feet north of switch, in boulder, bronze tablet stamped "1868 B 1912"	1,867.723
Tina, 0.9 mile northeast of, 200 feet south of first switchback, east edge of track; chisel point on boulder, chiseled "2021 U. S."	2,020.92
Meadow Bridge, 1 mile southwest of, west end of south abutment of culvert; chisel point, chiseled "2239 U. S."	2,238.72
Meadow Bridge, 20 feet northeast of station, 20 feet west of road crossing, in large boulder; bronze tablet stamped "2422 B 1912"	2,421.507
Meadow Bridge, 1.1 miles northeast of, 250 feet north of switch, at road crossing; chisel point on boulder, chiseled "2503 U. S."	2,502.55
Springdale, 0.7 mile southwest of, south side of track, at west end of hill; chisel point on rock, chiseled "2721 U. S."	2,721.18
Springdale, 300 feet east of station, south edge of public road, in ledge; bronze tablet stamped "2770 B 1912"	2,769.841

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[1] Other elevations on this railroad are given in list for Montgomery Quadrangle.

	Feet.
Springdale, 1.1 miles northwest of, north side of road; oak tree 1 foot in diameter at fence corner, scribed "3044 U. S."	3,044.15
Springdale, 2.2 miles northwest of, west edge of road; nail in root of 3½-foot oak tree, scribed "3176 U. S."	3,176.06
Springdale, 3 miles northwest of, on stone stoop of Quinton Sub. Dist. No. 5 school building; chisel point, chiseled "3059 U. S."	3,058.60
Springdale 3.5 miles northwest of, 650 feet west of S. T. Gilkeson's blacksmith shop, north edge of road, in large ledge; bronze tablet stamped "3244 B 1912"	3,244.018
S. T. Gilkeson's blacksmith shop, 0.9 mile northwest of, 500 feet west of forks of road, west edge of road; nail in root of 2-foot chestnut tree, scribed "3245 U. S."	3,244.97
Danese, 1.7 miles southeast of, at forks of road leading south; nail in root of 1-foot white oak tree, scribed "2978 U. S."	2,977.39
Danese, 0.6 mile southeast of, east edge of road; nail in root of 2-foot oak tree, scribed "2702 U. S."	2,701.88
Danese, 100 feet east of, 40 feet north of Lady Hall Sub. Dist. No. 5 school building, south edge of road in ledge; bronze tablet stamped "2637 B 1912"	2,636.896
Maplewood, 0.9 mile south of, south edge of road, where road turns to right, 25 feet north of Maplewood Chapel (Methodist Episcopal Church); chisel point on cement walk, chiseled "2705 U. S."	2,704.53
Maplewood, 50 feet south of post-office, south edge of road, at road forks; chisel point on rock, chiseled "2717 U. S."	2,716.58
Maplewood, 0.6 mile northwest of, 200 feet north of railroad right of way, west edge of road; chisel point on boulder, chiseled "2618 U. S."	2,617.68
Maplewood, 1.6 miles west of, at forks of road to S. E. Gwinn's farm house, south edge of road; nail in root of 1-foot sourwood tree, scribed "2872 U. S."	2,871.83
Landisburg, 1.9 miles southeast of, 300 feet west of S. E. Gwinn's farm house, south edge of road; chisel point on boulder, chiseled "2769 U. S."	2,768.46
Landisburg, 800 feet west of, 20 feet north of track, in ledge; bronze tablet stamped "2365 B 1912"	2,364.577
Landisburg, in front of post-office; top of rail	2,349.2
Landisburg, 1.9 miles northeast of, at summit of hill, south edge of track, 100 feet west of road crossing; nail in root of 1-foot chestnut tree, scribed "2417 U. S."	2,416.89
Clifftop, 1.9 miles west of, west edge of road; nail in root of 12-inch oak tree, scribed "2097 U. S."	2,096.52
Clifftop, 2.6 miles southwest of, 100 feet west of railroad bridge over Glade Creek, south side of creek, 20 feet west of water tank, in face of cliff; bronze tablet stamped "1967 B 1912"	1,967.059
Sewell, 3.2 miles east of, south edge of road; chisel point on boulder, chiseled "1854 U. S."	1,853.33
Sewell, 2.1 miles east of, south edge of road; chisel point on boulder, chiseled "1625 U. S."	1,624.52

From Springdale north along highway to Riverside. (Line leveled twice).

	Feet.
Springdale, 1.1 miles northwest of, 200 feet south of road crossing, 200 feet south of switch; chisel point on west end of north abutment, chiseled "2675 U. S.".	2,674.95
Springdale, 2.6 miles north of, 40 feet east of track; copper nail in base of 3-foot oak tree, scribed "2543 U. S.".	2,543.10
Springdale, 3.9 miles north of, east edge of track, chisel point on boulder, chiseled "2465 U. S.".	2,465.05
Sturgeon Branch, 200 feet east of station, south end of west abutment of railroad bridge; bronze tablet stamped "2420 B. 1912".	2,419.396
Sims, 40 feet north of station; chisel point on boulder, chiseled "2419 U. S.".	2,419.09
Rainelle, 1 mile west of, 40 feet west of track; copper nail in base of 2½-foot white-oak tree, scribed "2399 U. S.". .	2,398.97
Rainelle, in west side of stoop of bank building; bronze tablet stamped "2425 B 1912".	2,424.601
Rainelle, 1.6 miles northeast of, 40 feet north of track; copper nail in base of 1-foot oak tree, scribed "2393 U. S.".	2,392.49
Aldrich Camp, 3.3 miles northeast of Rainelle, 40 feet south of track, at point where river turns north, in large boulder; bronze tablet stamped "2395 B 1912".	2,395.396

MONTGOMERY 15′ (Kanawha Falls 30′) QUADRANGLE.

From point 2.13 miles west of Wriston north down Loop Creek along Virginian Ry. to Deepwater.[1]

Wriston, 2.13 miles west of, 2.82 miles east of Kincaid, 800 feet east of mile-post "DW-12," nearly opposite residence of Mr. Kincaid, on top step of south end of small stone culvert, chiseled square; marked "1289".	1,288.62
Kincaid, 0.97 mile south of, 8 feet west of Virginian Ry., on outside of long curve, 100 feet west of Loop Creek, in sharp bend, 500 feet south of mile-post "DW-10," in sandstone outcrop; aluminum tablet stamped "1184".	1,183.785
Kincaid, opposite and 200 feet west of post-office, 1,200 feet south of mouth of Lick Branch, on top stone of east corner of north abutment of railroad bridge; chiseled square, marked "1137".	1,136.61
Page, 1.26 miles north of post-office, 8 feet west of Virginian Ry., 250 feet south of mile-post "DW-7," opposite coal hollow and town of North Page, in sandstone outcrop; aluminum tablet stamped "1065".	1,064.190
Robson, 3.33 miles north of, 500 feet north of point opposite mouth of Big Right Fork, 60 feet north of mile-post "DW-2," on east corner of south bridge seat of double-span triple I-beam bridge 4; chiseled square, marked "769"	768.65

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[1] Other elevations near Robson will be found in list for Fayetteville Quadrangle.

	Feet.
Robson, 4.03 miles north of, (0.88 mile south of Deepwater post-office), 200 feet south of point opposite mouth of Little Right Fork, 2,000 feet south of mile-post "DW-1," in west corner of north bridge seat of railroad bridge 1 across Loop Creek; aluminum tablet stamped "715"	714.134
Deepwater, at railroad crossing; top of rail, marked "651"	649.9
Deepwater, 1,000 feet east of post-office, 30 feet north of Chesapeake & Ohio Ry. tracks, on sandstone boulder; chiseled square, marked "647"	646.38
Boomer, in front of station; top of rail	644.9
Harewood, in front of station; top of rail (see primary b. m.)	643.0
Longacre, in front of station; top of rail	645.1
Smithers, in front of station; top of rail	640.4
Cannelton, in front of station; top of rail	638.8
Cannelton, 1.03 miles west of, in east face of masonry near north end of Kanawha Lock 2; bronze tablet stamped "614 Knwa" (old bench mark—elevation given in 21st Annual Report, 614.205)	613.485
Lock 2, top of coping over tablet (elevation given in 21st Annual Report, 614.530)	613.808
London, in front of station; top of rail	636.0
London, 395 feet north of, east of track, in top of railroad culvert, aluminum tablet stamped "636"	635.334
Hugheston, in front of station; top of rail	629.1
Riverside, in top of coping stone at northwest corner of head of Lock 3; aluminum tablet stamped "606"	605.466
Riverside, in front of sign-board; top of rail	626.5
Cedar Grove, in front of station; top of rail	619.5
Cedar Grove, 1.95 miles west of, in top of bridge seat in east abutment at north side of railroad culvert; aluminum tablet stamped "618"	617.316
Shrewsbury, in front of station, top of rail	617.2

RALEIGH 30′ QUADRANGLE.

Glade, in front of station; top of rail	1,242.2
Glade, 0.75 mile west of, north of track, 250 feet west of mile-post "Cin. 290," in top of railroad culvert; aluminum tablet stamped "1233"	1,232.434
Quinnimont, 40 feet south of station, in top of north abutment at west side of railroad bridge; aluminum tablet stamped "1200"	1,199.058
Quinnimont, in front of station; top of rail	1,201.5
Prince, in front of station; top of rail	1,192.1
McKendree, 0.21 mile east of, 85 feet east of mile-post "Cin. 282," north of track, in face of boulder; aluminum tablet stamped "1137"	1,136.459
McKendree, in front of station; top of rail	1,130.5
Thayer, in front of sign-board; top of rail	1,111.3
Thayer, 60 feet east of sign-board, south of track, in top of west abutment of railroad bridge; aluminum tablet stamped "1111"	1,110.018
Alaska, in front of sign-board; top of rail	1,095.8
Claremont, in front of station; top of rail	1,089.8

	Feet.
Stonecliff, 0.17 mile east of, in foundation of semaphore-pole; aluminum tablet stamped "1083"	1,082.060
Stonecliff, in front of station; top of rail	1,079.3
Thurmond, in front of station; top of rail	1,070.9
Thurmond, in north abutment on west side of railroad bridge over New River; aluminum tablet stamped "1068"	1,067.457
Rush Run, in front of station; top of rail	1,045.7
Beury, in front of sign-boad; top of rail	1,037.8
Beury, 160 feet east of sign-board, in top of west abutment at north side of railroad culvert; aluminum tablet stamped "1036"	1,035.596
Fire Creek, in front of station; top of rail	1,034.2
Sewell, 0.58 mile south of, 170 feet south of mile-post "Cin. 268," in foundation of semaphore-pole; aluminum tablet stamped "1011"	1,010.113
Sewell, in front of station; top of rail	1,008.2

WINONA QUADRANGLE.

From Keslers Crosslanes along highways south to Carnifex thence east to Fowler Knob (leveled twice).

Keslers Crosslanes, 600 feet south of store and crossroads 100 feet south of S. P. Campbell's house, west of road, in ledge; brass bolt stamped "1568 Knwa"	1,567.998
Keslers Crossiance, 1.4 miles south of, west side of road, in root of tree, copper nail with washer stamped "U. S. G. S. W. Va. B. M."	1,657.26
Keslers Crosslanes, 2.6 miles south of, west side of road, in root of tree; copper nail with washer stamped "U. S. G. S. W. Va. B. M."	1,706.40
Carnifex, north side of Gauley River, 35 feet north of ferry landing, east side of road, in large ledge; bronze tablet stamped "1190"	1,190.647
Carnifex, 1.6 miles southeast of, east side of road, on ledge; chiseled square	1,813.73
Mount Lookout post-office, 90 feet east of, north side of road, in root of tree, copper nail with washer stamped "U. S. G. S. W. Va. B. M."	1,981.20
Mount Lookout, 1 mile southeast of, 250 feet south of schoolhouse, east side of road, in ledge of rock; aluminum bolt stamped "2069 Knwa"	2,070.448

From Fowler Knob along highways southwest to Russellville, thence southeast to Riverside (Meadow River).

Millers Ferry (over Meadow River), 0.1 mile north of, east of river, west of road, in ledge of rock; aluminum bolt stamped "1905 Knwa"	1,905.917
Russellville, 90 feet north of, east of road, west of river, in ledge of rock; aluminum tablet stamped "1900" Knwa"	1,901.102
Riverside (at Meadow River), 150 feet northwest of, 800 feet east of ford, west of road, between house and barn, in one of several ledges of rock; aluminum bolt stamped "2324" Knwa	2,325.219

Near Riverside.

	Feet.
Clifftop, 0.5 mile west of, 100 feet east of switch, 15 feet north of track; nail in root of 1½-foot spruce tree, scribed "2291 U. S."	2.291.17
Camp No. 1, 0.3 mile south of, west edge of track; chisel point on large boulder; chiseled "2374 U. S."	2,373.87
Riverside, 0.2 mile south of, west edge of track; chisel point on boulder, chiseled "2351 U. S."	2,351.38

SECONDARY ELEVATIONS.

Place	Quadrangle	County	Elevation
Big Sewell Mountain	Hinton	Fayette	3.500
Boggs Knob	Raleigh	Fayette	3,600
Page triangulation station	Fayetteville	Fayette	2,543
Paint triangulation station (Lick Knob)	Raleigh	Fayette, Raleigh	3,268
Potato Hill	Hinton	Fayette, Raleigh	3,256
Town Creek Knob	Raleigh	Fayette, Raleigh	3,088

INDEX

A

Page

Abbreviations, Coal Test Records 389
Abbreviations, Oil and Gas Companies 341
Abbreviations, Oil and Gas Sands 341
Absence of Faults.......... 96
Absence of Development (Clay Industry) 905
Account, General:
  Allegheny Series.......... 224
  Kanawha Group..........230-1
  Mauch Chunk Series......332-3
  New River Group.........294-5
  Pocahontas Group.........323-4
Age of the Kanawha Group..........279-293
Aileen Coal Co. "Keeneys Creek" Mine (110)........ ....377, 689-90, 875, 879, 884, 895
Ajax Coal Co. "Ajax" Mine (107) 377, 686-7, 875, 879, 884, 895
Alaska Coal & Coke Co., "Alaska" Mine (201)....... ....825-6, 877, 880, 893, 895
Alaska Coal & Coke Co., Drift Mine No. 2 (202)..205, 206, 826
Alaska—0.8 Mile Southeast Section 206, 221
Albion—Woods Ferry Section 139-140, 221
Aldrich Camp—Maywood Section 202-3, 222
Allegheny Series.......... 97
Allegheny Series:
  Description of Members...224-9
  General Section.......... 98-9
  Minable Coals..........455-469
  Oil and Gas Sands......... 337
  Stratigraphy (Chapter V).224-9
  Thickness 221-3
Allen, Capt. Thos.......341A, 356
Alma "A" Coal.......103, 153, **251**
Alma Coal, Little.........103, **252**
Alma (Draper) Coal......... 88, 103, 117, 118, 144, 145, 147, 152, 167, 191, 192, 193, **251-2,** 253, 288, 289, 386, 394, 470, 490, **492-8** 501, 507, 524, 525, **867**
Amick, Chas. M., Opening (500) 789
Amick-Jordon, Jno., Core Test (97) 388B
Amick, Jas. A.......... 820
Amick, J. W., Coal Opening (246) 306

Page.

Amick, R. E.......... 611
Amick, R. E., Opening (292).......... 497
Ammonia, Yield of.......... 542
Analyses, Briquets:
  Fire Creek Coal.......... 844
  Sewell Coal.......... ....700, 717, 724, 737, 767
Analyses, Coal:
  Alma 492
  Beckley 897
  Castle 306
  Cedar Grove.......... 488
  Chilton 484
  Douglas (Kidd)........672, 875
  Eagle 613, 632, 634, 635, 873-4, 884
  Fire Creek.......... 796, 804, 806, 830, 831, 877, 892-4, 897
  Gilbert 662, 875
  Glenalum Tunnel......... 874-5
  Hughes Ferry.......... 875
  Little Eagle......... 874-5, 884
  Little Fire Creek.......... 877
  Middle Kittanning......... 456
  No. 2 Gas.......... 500, 538, 540, 541, 544, 545, 546, 553-4, 561, 571, 572, 871-3, 883
  No. 3 Pocahontas.....861, 877
  No. 6 Pocahontas.......850, 877
  Powellton 586, 596, 599, 606, 873, 883
  Sewell 677, 680, 753, 759, 761, 774, 775, 875-7, 884-892, 897
  Stockton 470
  Winifrede 481
Analyses, Coal, Table 1......871-7
Analyses, Coal, Table 3....883-894
Analyses, Coal, Table 4...... 897
Analyses, Coal, Description of Tables..........870, 896, 898
Analyses, Coke:
  Eagle 635, 881
  Fire Creek.....807, 808, 809, 881
  No. 2 Gas.......... ......540, 546, 547, 572, 573, 881
  Powellton 600, 881
  Sewell 762, 775, 881
Analyses, Coke, Table 2....... 881
Analyses, Coke, Description of Table 2.......... 870
Analyses, Extraction:
  Fire Creek Coal Briquets.. 844
  Sewell Coal Briquets...... ....700, 717, 724, 737, 767

Page.
Analyses, Gas:
  Eagle Coal............633, 634
  No. 2 Gas Coal............
  ....542, 543, 563, 569, 571
  Powellton.....588, 592, 596, 597
Analyses, Glass-Sand........ 912
Analyses, Limestone:
  Eagle 265
Anderson, John F., Opening (524) 793
Animal Products............. 20
Annual Temperature and Precipitation at Beckley...... 31
Annual Temperature and Precipitation at Powellton..... 30
Ansted—Hawks Nest Section.
  ....88, 170-2, 221
Ansted, Description......... 23-4
Ansted, Prof. David Thomas.. 24
Anschutz, F. H.............. 47
Anticlinal Spurs, Minor...... 95
Anticline, Boggs Knob....... 94-5
Anticline, Mann Mountain... 91-2
Anticline, Ravenseye......... 93
Anticlines 91
Appendix "A" — Some Revisions in Correlation for Members of the Kanawha Group in Mingo County, W. Va. 925-8
Appendix "B"—Levels Above Mean Tide...............929-946
Arbuckle Creek.............35, 39
Arbuckle Creek Branch, C. & O. R. R.................... 12
Arbuckle Creek Branch, C. & O. R. R., Levels............ 931
Arbuckle Creek Mines........ 721
Archer Mine (8)........146, 167-8
Archer Mine, Production..... 379
Area of County.............. 19
Area of Districts............ 19
Area of Drainage Basins....38-39
Area of Drainage Basins by Districts 37
Area of Drainage Basins of Rivers 38
Areas Suitable for Reforestation 923-4
Armstrong Creek............34, 38
Arrowwood Creek............ 39
Ashley, A. W...............786, 787
Ashley, A. W., Opening (184)
  ....786, 877, 879
Ashley, A. W., Opening (193)
  786
Atkinson, G. W.............. 182
Available Clay.............905-7
Available Coal by Districts, Summary 867
Available Sand............. 912
Available Stone............. 910
Available Water Power.....914-22
Average Gauge Reading of Kanawha River by Months.... 8
Page.
Average Gauge Reading of Kanawha River by Years.. 9

B

"B" 341
Babcock Coal & Coke Co.....
  ....200, 388, 388B, 388C
Babcock Coal & Coke Co.:
  "Clifftop" Drift No. 1 (181)..
  ....788, 876, 879
  Drift No. 2 (183)......... 788
  Drift No. 3 (182).......... 788
  Production 377, 384
  No. 1 Core Test (101A)... 388B
  No. 2 Core Test (101).... 388B
  No. 3 Core Test (102).... 388C
  No. 4 Core Test (104).... 388C
  No. 5 Core Test (103).... 388C
  No. 6 Core Test (99)..... 388B
  No. 7 Core Test (98)..... 388B
  No. 4 Drift Mine (180)....787-8
  Railroad (Manns Creek), Levels 934-5
Babcock, E. V............... 788
Baby Mine, Production........ 378
Bachman Mine, Production... 379
Bachman, V................ 705
Backus, C. D............... 343
Backus, C. D., No. 1 Well (4)
  ....341A, 343
Bailey, C. T.................
  ..41, 61, 62, 70, 71, 72, 77, 78, 80
Bailey, Wm...190, 191, 487, 491, 551
Ballinger Coal Co.:
  Drift Mine (123)........... 701
  Drift Opening (178)........ 784
  Flanagan Mine (124)....... 701
  No. 1 Mine (122)...........
  ....700-1, 875, 879, 885, 895
  No. 1 Mine, Production..... 377
  No. 2 Mine (114)........... 692
  Production 377
Barbour-Upshur-Randolph Report...............236, 310, 336
Barton, R. R............125-6, 467
Basins, Drainage........... 37-83
Basins, Drainage, Area..... 38-39
Basins, Drainage, Area by Districts 37
Bays, Jacob R..77, 78, 79, 80, 81, 83
Bean, Geo.................... 934
Beard, J. B................. 772
Beards Fork Mine (51A)....
  ....537, 872, 878
Bearwallow Conglomerate (Dotson) Sandstone........
  106, 138, 142, 143, 149, 155, 157, 159, 164, 167, 172, 183, 185, 186, 188, 189, 192, 193, 195, **271-3,** 274 275, 296, 344, 350, 366, 663, 670, 671, 674, 910.
Beckley Coal.................
  88, 89, 109, 112, 179, 182, 198, 201, 209, 218, **317,** 318, 319, 387, 388A,

Page.

Beckley Coal................. 388B, 388C, 401, 411, 412, 413, 415, 416, 417, 418, 430, 431, 434, 440, 446, 447, 448, 452, 453, 454, 455, 727, 813, 897, xxvii, xxix, xxx
Beckley Coal, Lower.......... 88, 89, 109, 169, 177, 182, 196, 198, 199, 200, 201, 203, 204, 205, 206, 207, 208, 209, 211, 212, 213, 294, 318, **319-20**, 321, 350, 353, 375, 387, 388A, 388B, 388C, 414, 415, 416, 417, 418, 421, 424, 430, 431, 434, 446, 447, 448, 450, 451, 452, 453, 454, 455, 676, 717, 729, 795-849, 867.
Beckley Coal, Lower.................... (See Fire Creek Coal)
Beckley Quadrangle, Levels, 936-7
Beckley "Rider" Coal................ 109, 416, 417, 431, 440, 454
Beckley, Temperature and Precipitation at................ 31
Beckwith—1.7 Miles West Section....................150, 221
Beech Creek (Beechwood) Mine (93)....................... 183, 185, 186, 188, 262, 647, 656-7, 874, 879, 884, 895.
Beechwood Coal & Coke Co.:
  No. 1 Mine (200)........... 377, 823, 824-5, 877, 880, 881, 882, 893, 895.
  No. 2 Mine (199)........................377, 823-4, 892-3, 895
  Production 377
Bell Creek Coal Co. Mine (11) 476-7, 871, 878
Bell, J. Wade..............692, 697
Bells Creek of Twentymile Creek 39
Belva, Gaging Station Records 68-75
Belva—0.7 Mile South Section 133-5, 221
Belva—1 Mile Northeast Section..................135-6, 221
Benedum-Trees Oil Co....341, 341A
Bens Creek Coal..........104, 261
Bens Creek Sandstone.....104, 261
Berea Sand.................. 336, 337, **340**, 341A, 343, 344, 346, 347, 348, 350, 352, 353, 358, 359, 360, 361, 363, 364, 365, 367, 368, 369, 371.
Berea Sand, Contours......... 360
Berea Sand, Depth to........341A
Bertolet, H. M................ 782
Berwind, E. J................388B
Berwind, E. J., Core Tests:
  No. B2 (89)...........388B, 441
  No. B3 (67)...........388B, 425
  No. B6 (85)...........388B, 437
  No. B16 (66)..........388B, 424
  No. C (90)..........388B, 441-2
Berwind, E. J., Core Tests:
  No. 4 (61).............388B, 422
  No. 25 (62).......192, 388B, 423
Beury Bros. Coal & Coke Co.. ....388, 388C, 784
Beury Bros. Coal & Coke Co.:
  "Echo" Mine (177)......... 784
  "Echo" Mine (196)......... ..198, 199, 817, 877, 880, 892, 895
  Mine (176).........198, 199, 784
  Mine (198)................ 821-2, 877, 880, 881, 882, 892, 895
  Production 377
Beury Bros. Prospect (225)... ....861, 865, 877, 880
Beury Bros. Prospect (579)... 855
Beury Coal & Coke Co.....821, 823
Beury, J. L., Heirs........... 840
Beury, J. L., Opening (501)... 789
Beury No. 3 Core Test (111).. ....388, 388C
Beury Section..........199-200, 221
Beurytown Section.....215-16, 221
Beury, Wm.,-Cooper & Co..... 784
Beury, Wm., Core Test (108), 388C
Big Bend Coal Co. "Dimmock" Mine (197).........818, 877, 880
Big Bend Coal Co., Production 377
Big Bend Mine, Production... 377
Big Creek of Gauley River.... 39
Big Creek of New River...... 38
Big Injun Sand............... 124, 135, 160, **337**, **339**, 341, 341A, 343, 344, 345, 346, 348, 351, 352, 353, 357, 358, 359, 361, 363, 365, 367, 369, 371.
Big Injun Sand, Depth to... 341A
Big Lime.................... 123, 135, 160, 336, **337**, **339**, 340, 341, 341A, 342, 344, 346, 347, 348, 349, 351, 352, 353, 355, 356, 358, 360, 361, 363, 365, 366, 367, 368, 369, 370, 371.
Big Lime, Depth to......... 341A
Big "Q" Mine (213).......... .....379, 836, 877, 880, 893-4, 896
Birdsboro Steel & Foundry Co. 417
Bishop—0.6 Mile Northwest Section 188, 221
Blackband (Hernshaw) Coal.. 102, 114, 117, 136, 141, 153, 156, 162, 167, 171, 191, 245, **246-7**, 287, 386, 389, 393, 926, 927, 928.
Blackburn, H. H............. 816
Black Flint, Kanawha........ 88, 101, 114, 115, 116, 117, 118, 119, 120, 122, 124, 125, 126, 130, 131, 133, 135, 136, 144, 146, 147, 152, 156, 158, 170, 225, 226, 232, **233-4**, 235, 236, 238, 241, 243, 257, 279, 281, 282, 360, 367, 386, 390, 459, 460, 461, 463, 464, 465, 466, 467, 471, 473, 476, 478, 505, 533.
Black Marble................ 263

Page.

Blake, Bud, Lessee, Mine (310) 532
Blake, J. A., Lessee, Mine (311) 150, 532
Blake, William 25, 27
Blankenship, Lawrence 726
Blankenship, Lawson 656
Blithers, Samuel 469
Blue Contours 260
Blue Hole Tunnel 307
Blue Jay Mine (150) 729
Blue Ridge Railroad 10
Bluestone River, Indicated Horse-Power Developed by .. 916
Blume Coal & Coke Co.:
  Blume Mine (117) 694-5, 875, 879, 885, 895
  Production 377
Boggs Knob Anticline 94-5, 358, 359
Boggs Knob—Sims Station Section 218, 221
Bolar, Coleman 674
Bolar, Mary A., Opening (437) 666
Bolar, Mary A., Opening (458) 674
Bolen No. 1 Core Test (69) 388B, 404
Boley, Geo. W., Opening (466) 703
Bolivar Fire Clay Shale 98
Boomer Branch 38
Boomer Coal & Coke Co..126, 467
Boomer Coal & Coke Co.:
  Mine (72) 617
  No. 1 Mine (27) 510, 871, 878
  No. 2N Mine (73) 617-18, 875, 878, 884, 895
  No. 3 Mine (28A) 511, 871, 878
  No. 4 Mine (28) 510-11
  No. 5 Mine (26) 509
  Opening (294) 512
  Opening (296) 513
  Production 377
  Prospect (363) 619
Boomer—½ Mile East Section 126-7, 221
Boomer Section 125, 221
Boone Coal & Coke Co. 692
Boone Coal & Coke Co., Michigan Mine (106) 686, 875, 879
Boone Coal Co. 388B
Boone Coal Co. (Mc [illegible]) Opening (451) 671
Boone County Report 219, 925
Boone County Well Records. 341A
Boone Mine, Production 378
[illegible] Falls 25
Boyd, Jas. H. 730, 812
Brachiopods 259, 262
Brackens Creek 34, 36
Brackens Creek Coal & Land Co. 388, 388A, 388B, 402, 443, 444, 445
Brackens Creek Coal & Land Co.:
  Core Test (25) 388A, 402
  Core Test No. 1 (93D) 388B, 445-6
  Core Test No. 2 (93) .388B, 443-4
  Core Test (93A) 388B
  Core Test No. 3 (93C) .388B, 455
  Core Test No. 4 (93B) .388B, 444
  Mine (179) 784
  Opening (487) 785
  Prospect (463) 702
  Prospect (469) 704
  Prospect (488) 785
Brady, A. P. .... 464, 466, 468, 477, 501, 502, 503, 505, 507, 508, 509, 510, 512, 522, 523, 524, 526, 529, 530, 581, 582, 623, 624, 625, 626, 684, 685, 686, 688, 689, 691, 692, 693, 694, 696, 697, 698, 700, 706, 707, 709, 711, 712, 714, 715, 717, 721, 731, 733, 734, 738, 739, 747, 748, 764, 767, 770, 772, 776, 778, 810, 811, 816, 817, 818, 821, 822, 824, 825, 826, 828, 829, 831, 832, 833, 836, 837.
Branch Coal & Coke Co., Production 377, 384
Branch Coal Co., Chapman Mine (132) 711-12, 875, 881, 882, 886, 895
Braxton-Clay Report 225, 229, 232, 337, 343, 456
Brellahan, M. W. 53
Brick 909
Brick Plant Site 905-7
Bridges, W. K. 616
Briquet Tests, Fire Creek Coal 805-6, 841-4
Briquet Tests, Sewell Coal ... 699-700, 716-17, 723-4, 736-7, 766-7, 774-5.
Broeman, F. C. 605
Brooklyn Coal & Coke Co. ... 714
Brooklyn Mine (135) .... 379, 384, 714-17, 876, 879, 881, 882, 886-7, 895.
Brooks, A. B. 922
Brown Coal Co., Production ... 377
Brown Coal Co., South Nuttall Mine (131) 709-10, 875, 879, 886, 895
Brown Mine, Production 377
Brownstown (Powellton) Coal 88, 104, 121, 125, 127, 129, 131, 132, 139, 148, 150, 151, 154, 155, 156, 161, 163, 164, 165, 167, 171, 177, 191, 194, **255-7**, 259, 264, 362, 368, 375, 386, **389-95**, 397, 470, 529, 582, **578-613, 867, 873, 883.**
Brownstown Sandstone 104, 121, 129, 132, 147, 150, 154, 155, 156, 167, 171, 173, 194, **255-6**, 258, 362, 386, 392, 395, 397, 581, 601, 608, 612

Page.

Brush Creek, Indicated Horse-Power Developed by....... 919
Brush Creek Limestone, Fossils 283
Buck Run Mine, Production... 377
Buck Run No. 1 Mine (34)... ....516, 872, 878
Buck Run No. 1 Mine (35)... ....517, 872, 878
Buffalo Collieries Co. Mine.... 288
Buffalo Creek Coal........... 101, 190, **240,** 243, 286, 287, 288
Buffalo Creek Coal Co........ 823
Buffalo Creek Limestone...... 101, 112, 119, **240,** 243, 279, 281, 282, **286-93**
Buffalo Creek of Meadow River 39
Buffalo Creek of New River, 36, 39
Buffalo Creek Section, (Mingo County) 286-9
Buffalo Mine, (Ephraims Creek) (203)....826-8, 877, 880, 893, 895
Buffalo Mine, Production..... 377
Building Stone..............909-11
Building Stone, etc. (Chapter XII) 904-924
Bulletin 2 (W. Va. G. S.).... 465, 466, 477, 478, 479, 501, 503, 504, 505, 507, 508, 509, 510, 511, 512, 514, 515, 516, 522, 523, 524, 525, 526, 528, 530, 532, 557, 582, 602, 603, 618, 624, 625, 626, 627, 630, 637, 645, 656, 683, 684, 685, 686, 688, 689, 691, 693, 694, 696, 698, 700, 705, 706, 707, 708, 709, 711, 713, 714, 715, 717, 719, 720, 721, 722, 725, 726, 727, 728, 730, 732, 733, 734, 735, 738, 739, 740, 741, 742, 743, 744, 745, 747, 748, 749, 764, 765, 767, 770, 771, 772, 776, 777, 778, 779, 780, 788, 799, 800, 810, 811, 812, 813, 815, 816, 817, 818, 821, 822, 823, 824, 825, 826, 828, 829, 832, 833, 834, 836, 837, 841, 845, 846.
Burges Farm Coal Test (60) 388B, 421-2
Burns, Widow, Opening (371) 621
Burns, Widow, Opening (401) 650
Burnwell Coal............... ......(See Campbell Creek Coal)
Burrows, J. S.....557, 582, 748, 800
Buster, J. A., No. 1 Well (13) 341A, 346-7
Buster, Matt................. 623
Butcher Branch.............. 38

C

Cabell-Wayne-Lincoln Report. 227
Cabin Creek................36, 38

Page.

Cabin Creek District (Kanawha), Detailed Core Tests 389-90, 397-8
Cabin Creek District (Kanawha), Well Records.......... ....341A, 359-372
Cabin Creek Oil Pool......... ....336, 340, 348, 359-372
Cabot, G. L.............341A, 347
Callahan, J. M............9, 16, 915
Callison, I. A................ 855
Calvert, W. R................ 518
Camp Branch................ 39
Campbell Creek Coal......... ....253-4, 498-578, 867, 871-3, 883
Campbell Creek Coal......... (See No. 2 Gas and Peerless Coals)
Campbell Creek Coal, Lower.. 103, 121, 134, 163, 167, 193, 254, **255,** 386, 390, 393, 394, 397, 528, 530
Campbell Creek Limestone.... 103, 117, 119, 150, 151, 153, 251, **252,** 258, 279, 281, 282, 285, 386, 493, 495, 525, 526
Campbell Creek Sandstone, Lower.........103, 121, **254,** 394
Campbell, J. M............... 515
Campbell, M. G...........479, 515
Campbell, M. R.............. 100, 271, 272, 295, 304, 307, 313, 317, 318, 333
Candle-Power of Gas........541-2
Cane Branch................. 38
Cannel Coal Co. Opening (273) 471
Cannelton Coal & Coke Co.... 502
Cannelton Coal & Coke Co.:
  Fan-House Opening No. 1 Mine (19).............. 503
  Mine No. 1 (19)........... ....502-3, 871, 878, 881, 882
  Mine No. 2 (20)..503-4, 871, 878
  Mine No. 3 (68)........... ....616, 897, 900, 901
  Mine No. 4 (21)............ 504
  Mine No. 5 (22)............ 504
  Production 377
Cannelton Section.....119-121, 221
Cannelton (Stockton) Limestone 104, 119, 121, 122, 125, 127, 131, 148, 151, 154, 156, 157, 239, **257-8,** 259, 279, 281, 282, 283, 386, 623
Caperton Mine (111)......... .....690-1, 881, 882, 884-5, 895
Cardiff Coal Co...527, 528, 601, 602
Carlisle Section.......189-190, 221
Carlisle Shaft Mine (158).... .....189, 190, 743-4, 745, 889, 895
Carnifex Ferry Section....... ....88, 89, 142-3, 221
Carver Bros.................. ......144, 465, 522, 524, 525, 625

Page.

Carver Bros. Mine (1)........................464-5, 871, 878

Castle Coal.................88, 89, 107, 129, 140, 172, 174, 175, 178, 181, 187, 202, **305-6,** 308, 387, 402, 405, 411, 412, 414, 416, 418, 422, 428, 437, 445, xxxii

Cataract Colliery Co.......... 706

Cataract Mine (128)...........................705-6, 875, 879

Catskill Formation........... 97

Catskill Formation, Thickness 221-3

Catskill Red Beds, Oil and Gas Sands of.................. 338

Cavendish, J. F., Opening (303) 520

Cavendish, J. F., Opening (374) 622

Cavendish, L. F.............. 665

Cavendish, L. F., Opening (432) 665

Cedar Coal...........105, **262, 263**

Cedar Coal, Little............105, 143, 186, 191, 194, **265,** 386

Cedar Grove Coal............102, 114, 115, 117, 118, 120, 139, 147, 153, 156, 171, 173, 191, 246, 247, 248, **249-50,** 251, 386, 390, 470, 485, **488-92,** 493, **867,** 928

Cedar Grove Coal, Lower..103, **250**

Cedar Grove "Rider" Coal.... ....**250,** 389

Cedar Grove Sandstone, Lower 103, 115, 116, 117, 118, 120, 121, 124, 127, 133, 141, 145, 147, 153, 156, 159, 171, 193, **251,** 252, 288, 389, 394

Cedar Grove Sandstone, Lower ....(See Peerless Sandstone)

Cedar Grove Sandstone, Middle 103, **250,** 288

Cedar Grove Sandstone, Upper 102, 114, 117, 133, 153, 156, 158, 173, **248-9,** 288, 289, 394, 926, 927

Cedar Grove Section....118-19, 221

Chance, H. M................ 226

Changes, Physiographic......32-37

Chapman & O'Neil........... 76

Chapman Coal & Coke Co..... 711

Chapman Coal, Coke & Iron Co. 690, 713

Chapman Mine (132)..........711-12, 875, 879, 881, 882, 886, 895

Chapman, W. L., Opening (271) 460

Chapter I.—Historical and Industrial Development.......1-31

Chapter II.—Physiography...32-85

Chapter III.—Structure......86-96

Chapter IV.—Stratigraphy—General and Special Sections 97-223

Chapter V.—Stratigraphy—Allegheny Series........ .224-229

Chapter VI.—Stratigraphy—Kanawha Group of Pottsville Series..............230-293

Chapter VII.—Stratigraphy—New River Group of Pottsville Series..............294-322

Chapter VIII.—Stratigraphy—Pocahontas Group of Pottsville Series.............323-331

Chapter IX.—Stratigraphy—Mauch Chunk Series, Mississippian 332-335

Chapter X.—Petroleum and Natural Gas............336-373

Chapter XI.—Coal and Coke.. 374-903

Chapter XII.—Clays, Road Material, Building Stone, Glass-Sand, Water-Power, and Forests.............904-924

Charleston, Brick Plants...... 904

Charleston, Maximum River Stages at.................. 6

Charleston, Minimum River Stages at.................. 7

Charleston, Rainfall at....... 5

Chemung and Portage Beds, Oil and Gas Sands......... 338

Chemung Formation, Thickness 221-3

Cherry River, Indicated Horse-Power Developed by........ 918

Chesapeake & Ohio Railroad.9-13

C. & O. R. R. Levels:
  Gauley Branch............. 932
  Keeney Creek Branch...... 931
  Laurel Creek Branch....... 930
  Loup Creek Branch......... 930
  Main Line................929-30
  Mill Creek (Hawks Nest) Branch 932
  Paint Creek Branch........ 932
  Powellton Branch.......... 932
  Rend (Arbuckle Creek) Branch 931
  South Side Branch.......... 931
  Whiteoak Branch........... 931

Chilton "A" Coal..101, 141, 167, **242**

Chilton Coal..................88, 102, 114, 117, 118, 120, 126, 132, 145, 156, 171, 190, 242, 243, **244-5,** 246, 287, 288, 362, 375, 386, 389, 470, **484-7,** 488, 867, 926

Chilton Coal, Little...............102, 167, **245,** 287, 288, 393

Chilton "Rider" Coal........ 101

Chilton Sandstone, Lower..... ....102, 141, 158, **245,** 287

Chilton Sandstone, Upper..... 101, 141, 156, 190, 192, **244,** 287, 362

Christian Colliery Co.:
  No. 1 Mine (81)...637-8, 874, 879
  No. 2 Mine (62A)...605, 873, 878

Christian Colliery Co.: Page.
  No. 3 Mine (336)............................549, 872, 873, 878
  Production 377
Christian, Frank P........... 828
Clapperton, John............. 721
Clarion Coal......99, 228, **229**, 238
Clarion Coal, Lower.......... 238
Clarion Coal, Upper.......... 238
Clark & Krebs............397, 533
Clay, Available..............905-7
Clay, Fire.................. 907
Clay, Residual............... 906
Clay, Transported...........905-6
Clays 904-7
Clays, Road Material, etc., (Chapter XII)...........904-924
Clear Fork District (Raleigh) Well Records........341A, 354-5
Clifftop Drift No. 1 (181)..........................788, 876, 879
Clifftop Drift No. 2 (183)..... 788
Clifftop Drift No. 3 (182)......788
Clifftop Drift No. 4 (180)....787-8
Clifftop Syncline.........92-3, 358
Climate 29-31
Coal:
  Alma (Draper)..251-2, 492-8, 867
  Alma "A"................... 251
  Beckley (War Creek, Slab Fork, Winding Gulf)..317, 897
  Beckley "Rider"................109, 416, 417, 431, 440, 454
  Bens Creek................ 261
  Black Band (Hernshaw)...246-7
  Brownstown (Powellton)........256, 578-613, 867, 873, 883
  Buffalo Creek.............. 240
  Burnwell (Campbell Creek) 253-4, 498-578, 867, 871-3, 883
  Campbell Creek (No. 2 Gas, Peerless, Upper War Eagle, Warfield, Freeburn, Burnwell) 253-4, 498-578, 867, 871-3, 883
  Castle 305-6
  Cedar 262
  Cedar Grove, (Island Creek, Red Jacket, Upper Thacker).......249-250, 488-492, 867
  Cedar Grove "Rider"........ 250
  Chilton (Point) 244-5, 484-7, 867
  Chilton "A"..................242
  Chilton "Rider"........... 101
  Clarion 229
  Coalburg......236-9, 474-80, 867
  Davy (Sewell)............. 310-11, 676-795, 875-7, 884-92, 897
  Dean-Fire Clay (of Kentucky) 245
  Dingess 246
  Douglas (Kidd)......................273-4, 672-6, 867, 875
  Douglas "A"............... 273
  Draper (Alma)......251-2, 492-8
Coal:
  Eagle (Middle War Eagle, Mohawk) 260-1, 613-47, 867, 873-4
  Eagle "A"................ 259
  Fire Creek (Quinnimont, Lower Beckley).......... 319-20, 795-849, 867, 877, 892-4, 897
  Freeburn (Campbell Creek)...253-4, 498-578, 867, 871-3, 883
  Gilbert.....271, 662-672, 867, 875
  Gilbert "A"................ 270
  Glenalum Tunnel.................268-9, 658-662, 867, 874-5
  Hatfield Tunnel (Powellton).....256, 578-613, 867, 873, 883
  Hernshaw (Black Band)...246-7
  Hughes Ferry (Iaeger)..........................299-303, 875
  Iaeger (Hughes Ferry).......................299-303, 875
  Iaeger "A"................. 299
  Iaeger "B"................. 297
  Island Creek (Cedar Grove)......................249-250
  Keystone 111
  Kidd (Douglas).......273-4, 875
  Landgraff 111
  Little Alma................ 252
  Little Cedar............... 265
  Little Chilton 245
  Little Coalburg............ 240
  Little Eagle.........................262-3, 647-658, 867, 874
  Little Fire Creek.....320-1, 877
  Little Raleigh (Snake Root)......................315-316
  Little Raleigh "A"......... 315
  Lower Beckley (Fire Creek) 319-20, 795-849, 867, 877, 892-4, 897
  Lower Campbell Creek......255
  Lower Cedar Grove (Lower Thacker) 103, 250
  Lower Clarion.............. 238
  Lower Douglas............276-8
  Lower Freeport. 99, 237
  Lower Iaeger............... 303
  Lower Mercer? (Stockton)....................234-5, 470-4
  Lower Kittanning (No. 5 Block)......228-9, 461-9, 867
  Lower Thacker (Lower Cedar Grove)...........103, 250
  Lower War Eagle.........266-7
  Lower Winifrede........... 242
  Matewan 259
  Middle Kittanning (No. 6 Block, North Coalburg).................226-7, 456-61, 867
  Middle War Eagle (Eagle)...............260-1, 613-47, 873-4
  Mohawk (Eagle)......................260-1, 613-47, 873-4

Page.

Coal—
No. 5 Block (Lower Kittanning, [illegible]) 229-9, 461-8, 867
No. 6 Block (Middle Kittanning) 229-7, 449-61, 867
No. 2 Gas (Campbell Creek) 253-6, 497-578, 867, 871-5, 882
No. 1 Pocahontas 245
No. 2 Pocahontas 245
No. 2 "A" Pocahontas 246
No. 3 Pocahontas 125, 441-4, 867, 877
No. 3 "Rider" Pocahontas 228-9
No. 4 Pocahontas 228
No. 5 Pocahontas 228
No. 6 Pocahontas 227-8, 440-49, 867, 877
No. 7 Pocahontas 228
No. 8 Pocahontas 222
No. 9 Pocahontas 222
North Coalburg (Middle Kittanning) 224-7, 458-61, 867
Peerless (Campbell Creek) 251-4, 498-578, 867, 871-5, 882
[illegible] 112
Powellton (Hatfield Tunnel, Brownstown) 254, 578-618, 867, 878, 882
Powellton "A" 256
Quakertown 108, 237, 258, 261
Quinnimont (Fire Creek) 119-20, 793-849, 867, 877, 882-4, 887
Red Jacket (Cedar Grove) 249-250
Roaring Creek (No. 5 Block) 229-9, 461-8, 867
Sewell (Davy) 218-21, 878-793, 867, 872-7, 882-92, 887
Sewell "A" 226
Sewell "B" 201-8
[illegible] 250, 270
[illegible] 111, 250
[illegible] (Beckley) 217, 867
Snake Root (Little Eagle) 246-249
Squire Jim 211
Stockton (Lower Mercer) 234-5, 478-81, 867
Stockton "A" (Upper Mercer) 232-3
Thacker 248
Upper Cherry 248
Upper Freeport 98, 127
Upper Kittanning 226
Upper Kittanning "Rider" 98
Upper Mercer (Stockton "A") 232-3
Upper Thurmond (Cedar Grove) 249-250

Coal—
Upper War Eagle (Campbell Creek) 253-4, 498-578, 871-5, 882
War Creek (Beckley) 217, 867
[illegible] (Campbell Creek) 251-4, 498-578, 871-5, 882
Welch 222-224
Williamson 246, 789
Winding Gulf (Beckley) 217, 867
Winifrede 241, 499-8, 867
Coal Analyses, Table 1 871-7
Coal Analyses, Table 2 882-894
Coal Analyses, Table 3 897
Coal Analyses, Tables 899-905
Coal and Coke (Chapter XI) 874-901
Coal and Coke Production Statistics 874-882
Coal and Coke Production by Mines (1913) 877-9
Coal Available by Districts 867
Coal Beds Mineable 385
Coal Beds, Number of Mines by 877
Coal, Mineable 867
Coal, Mineable ....
(See Mineable Coal by Magisterial Districts)
Coal Production of [illegible] 1888-1913 877
Coal Production, Order by Counties (1887-1913) 880
Coal River Oil Co. 281, 281A, 254
Coal Run 38
Coal Test Records 385-457
Coal Test Records Summarized 385, 388, 388A, 388B, 388C
Coal Valley Coal Co. 72
Coal Valley Mining Co. 428
Coalburg Coal 98, 101, 114, 118, 120, 122, 124, 130, 132, 133, 136, 137, 141, 158, 162, 166, 174, 180, 184, 195, **236-9**, 248, 261, 270, 281, 282, 287, 401, 402, 408, 470, **474-80**, 481, **867**, **871**
Coalburg Coal, Little 101, 137, 158, 190, **240**, 254
Coalburg Colliery Co. No. 1 Well (33) 281A
Coalburg Colliery Co. No. 2 Well (34) 281A
Coalburg Sandstone, Lower 101, 114, 115, 120, 158, **240**, 281, 287
Coalburg Sandstone, Upper 101, 114, 120, 122, 131, 134, 136, 137, 141, 158, 170, 190, **235-6**, 248, 281, 282, 287
Coals Mineable, Alleghany Series 441-467
Coals, Mineable, Kanawha Series ....[illegible]

Page.
Coals, Minable, New River Group 676-849
Coals, Minable, Pocahontas Group 849-866
Coals, Minable, Pottsville Series 470-866
Cochran, Wm.................. 764
C. O. G. Co..........133, 341, 341A
Coke Analyses, Table 2........ 881
Coke and Coal (Chapter XI) 374-903
Coke and Coal Analyses, Tables 869-903
Coke and Coal Production by Mines (1916)..............377-9
Coke and Coal Production Statistics 374-385
Coke Ovens...............384, 385
Coke Production by Companies (1916)................. 384
Coke Production by Counties (1916) 381
Coke Production by Years.... 383
Coke Production, Order by Counties (1897-1916)....... 382
Coking Tests:
  Eagle Coal................634-5
  Fire Creek Coal...........806-8
  No. 2 Gas Coal......545-7, 572-3
  Sewell Coal...........761-2, 775
Coking Tests, Cupola:
  Fire Creek Coal..........808-10
  No. 2 Gas Coal............547-8
  Sewell Coal...............762-3
Cole, C. F................... 550
Cole, Henry, Opening (302)... 520
Cole, James, Opening (303A).520-1
Coleman Heirs Core Test (33) 388A, 404
Coleman Heirs Opening (429) 663
Coleman, Mason, Opening (391) 646
Collins Boring (37)...388A, 412-13
Collins Colliery Co........26, 738
Collins Colliery Co., Production 377
Collins Mine (155)........... 309, 738-9, 876, 879, 881, 882, 888, 895, 897, 899
Collins Nos. 1, 2, 3 & 4 Mines, Production 377
Columbia—1.2 Miles S. 50° W. Section 153-4, 221
Columbia Mine (10)..151, 152, 469
Columbia Mine (50).......... ....151, 152, 527-8, 872, 878
Columbia No. 5 Mine, Production 378
Columbia Section..........152, 221
Columbus Iron & Steel Co... 388, 388A, 390, 391, 392, 393, 395
Columbus Iron & Steel Co.:
  Core Test (7).........388A, 395
  No. 1 Core Test (4)...388A, 392
Columbus Iron & Steel Co.:
  No. 1 Mine (23)............ 504-6, 871, 878, 881, 882, 883, 895
  No. 3 Core Test (2)..388A, 390-1
  Production 377, 384
Columbus Producing Co...... 359
Concho Mine (137)...717, 876, 879
Concho Nos. 1 & 4 Mines, Production 379
Conditions, Present Forest.... 923
Conemaugh Series, Oil and Gas Sands of.............. 337
Conklin & Ellsworth....41, 42, 66
Conley & Kincaid Opening (92) 651, 874, 879
Connoquenessing Sandstone Stage 236
Connoquenessing Sandstone, Upper 238, 239
Contours, Structure (Berea) (Black) 360
Contours, Structure (No. 2 Gas) (Green)...........86-7, 254
Contours, Structure (Sewell) (Red) 86-7, 310-11
Cook and Sons................ 684
Cook Mine (103).....684, 875, 879
Core Tests by Nos.:
  1....88, 388A, 389-90, 500, 521
  2..............388A, 390-1, 500
  3................388A, 391, 500
  4...........388A, 392, 493, 500
  5..............388A, 392-3, 500
  6.........388A, 393-4, 493, 500
  7.....................388A, 395
  8 and 9..............388A, 389
  10....................388A, 396
  11....................388A, 397
  12.119, 121, 388A, 397-8, 500, 521
  13..................388A, 398-9
  13A...............388A, 399-400
  14..................388A, 400-1
  15.....166, 167, 168-9, 388A, 401
  16....................388A, 402
  17....................388A, 401
  18...........174, 175, 388A, 403
  19, 20, 21, 22, 23, 24 and 25 ....388A, 403
  26..........176-7, 388A, 403, 404
  27 ....388A
  28..................388A, 404-5
  29........182, 183-4, 388A, 405-6
  30....................388A, 406
  31..................388A, 407-8
  32....................388A, 408
  33....................388A, 404
  34..................388A, 409-10
  35..................388A, 410-11
  36..................388A, 411-12
  36A...................388A, 404
  37..................388A, 412-13
  38..........185, 186-7, 388A, 413
  39 and 40.............388A, 404
  41..................388A, 413-14
  42..................388A, 414-15

Page.

Core Tests by Nos.:
43 and 44 [illegible]
[illegible]
[illegible]
[illegible]
[illegible]
49, 50, 50A and 51 [illegible]
[illegible]
[illegible]
54 and 55 [illegible]
[illegible]
57 and 57A [illegible]
[illegible]
[illegible]
[illegible]
[illegible]
[illegible]
63 and 64 [illegible]
[illegible]
[illegible]
[illegible]
[illegible]
69, 70, 71, 72 and 73 [illegible]
[illegible]
[illegible]
[illegible]
[illegible]
78 and 79 [illegible]
[illegible]
[illegible]
[illegible]
[illegible]
[illegible]
[illegible]
[illegible]
[illegible]
[illegible]
[illegible]
[illegible]
92 and 93 [illegible]
[illegible]
[illegible]
[illegible]
[illegible]
[illegible]
[illegible]
[illegible]
[illegible]
[illegible]
[illegible]
[illegible]
[illegible]
[illegible]
[illegible]
[illegible]
[illegible]

Page.

Core Tests by Nos.:
137, 138, 139, 140, 141 and 142 ....388C, 449
143 ....388C, 449-50
144 ....388C, 450-1
145 ....388C, 451
146 ....388C, 452
147 ....388C, 453
148 ....388C, 453-4
149 ....388C, 454
150 ....208-10, 388C, 455
151 ....388C, 455
Core Tests—Detailed Records:
Cabin Creek District (Kanawha) 388-90, 397-8
Falls District ....[illegible]
Fayetteville District .... 404-442, xxiv-xxxii
Greenbrier County....176-7, 404
Kanawha District.......395-401
Mountain Cove District....401-3
Nuttall District........403-4
Quinnimont District.....[illegible]-455
Sewell Mountain District 442-449
Shady Spring District (Raleigh) 449-455
Town District (Raleigh).432-442
Corliss—1 Mile North Section ....[illegible], 221
Correlation, Positions in Kanawha Group, Mingo County 925-8
Cost of Electric Power........921-2
Cost of Various Types of Roads .... [illegible]
Cotton Hill Section 190, 221
Cottrell, [illegible]................ [illegible]
County Jail .... [illegible]
Covington & Ohio Railroad... 19
Cox, Alf .... [illegible]
Craft & Evans Type Test Mine ([illegible]) ....[illegible]
Craig Branch .... [illegible]
Cranberry River, Indicated Horse-Power Developed by. 918
Crawford, Mrs. W. H., Opening ([illegible]) .... [illegible]
Crawford, R. R................ 669
Craze, T. B., Opening (274)... 471
Craze, T. B., Opening (277).. 476
Creek and River Gravel ... [illegible]
Crescent Mine (1) 458
Crescent Mine (2) ....464, 871, [illegible]
Crescent Mine Production.....[illegible]
Crescent Section 144-5, 221
Crider, A. F. .... [illegible]
Critchley, Jos. M., Opening ([illegible]) .... [illegible]
Cruikshank, A. F., Opening ([illegible]) .... [illegible]
Cruikshank, E. S. .... [illegible]
Cruikshank, E. S., Prospect ([illegible]) .... [illegible]
Cruikshank, J. W., Opening ([illegible]) .... [illegible]

Page.
Crookshank, Morris........... 820
Cunard Mine (134)....714, 876, 879
Cunningham, Geo. A......343, 346
Cunningham, J. S............ 203, 424, 425, 438, 439, 441, 446, 447, 448
Cunningham, Thomas......... 502
Cupola Tests of Coke:
  Eagle Coal................. 635
  Fire Creek Coal..........808-10
  No. 2 Gas Coal........547-8, 573
  Sewell Coal...............762-3
Daily Gage Height:
  Gauley River at Belva..... ...68, 69, 70, 71, 72, 73, 74, 75
  Kanawha River at Montgomery 42
  Meadow River at Russellville 76, 77, 78, 79, 80, 81, 82, 83
  New River at Fayette...... 45, 46, 47, 48, 49, 51, 52, 54, 56, 57, 59, 60, 61-66
Dams and Locks, Kanawha River 3
Danese Section............... 89
Data Concerning Locks and Dams in Kanawha River... 3
Data, Table of Stream.......33-36
Davis and Fudge Core Test (79) 388B, 404
Davis Branch................ 39
Davis, C. L....69, 70, 71, 72, 73, 74
Davis, Fudge et al. No. 1 Core Test (76).............388B, 428
Davis, Fudge et al. No. 2 Core Test (75)...........388B, 427-8
Davis, Fudge et al. No. 3 Core Test (74).............388B, 427
Davis Gordon Co............. 466
Davis, Harry P.............. 812
Davis, L. L................68, 69
Davy Coal......(See Sewell Coal)
Days Navigation Suspended on Kanawha River............ 4
Deal No. 1 Core Test (58)..... ....388B, 420-1
Dean-Fire Clay Coal.......... 245
Decota Sandstone.............. 104, 122, 154, 159, 183, 186, **261**, 391, 392, 394
Deepwater Railway.......... 13
Deepwater — ½ Mile North Section 127-8, 221
Deepwater Section........149, 221
Deike, G. H..........683, 690, 711
Deitz Colliery Co. Mine (12).. ....131, 132, 477-8, 871, 878
Deitz Colliery Co. Mine (13).. ....132, 478
Deitz Colliery Co. Mine (33).. ....131, 132, 515-16, 872, 878
Deitz Colliery Co., Production 377
Deitz Mine, Production....... 377
Deitz Section.............143, 221

Page.
Deitz, T. A...........514, 515, 516
Deitz, Theodore.............. 477
Dempsey, J. H............... 821
Dempsey, Lydia, Opening (345) 577
Department of Mines, W. Va. 375, 690
Depth of Oil and Gas Wells..341A
Derryhale Mine (163)........ ....764-7, 876, 879, 890, 895
Derryhale Mine, Production.. 378
Description, General.........18-31
Description, General, Allegheny Series............... 224
Description of Folds........91-95
Description of Members:
  Allegheny Series..........224-9
  Kanawha Group........231-278
  Mauch Chunk Series......332-5
  New River Group.......295-322
  Pocahontas Group........324-331
Description of Oil- and Gas-Bearing Sands...........338-340
Description of Species.....289-292
Detailed Boring Records:
  Falls District...........389-395
  Fayetteville District....... ....404-442, xxiv-xxxii
  Kanawha District.......395-401
  Mountain Cove District....401-3
  Nuttall District...........403-4
  Quinnimont District.....449-455
  Sewell Mountain District..442-9
Detailed Structure...........90-96
Development, Absence of (Clay Industry) 905
Development, Historical and Industrial (Chapter I)......1-31
Development, Present (Water-Power) 913-14
Development, Recent Oil and Gas, in Kanawha County, 359-372
Devonian, Oil and Gas Sands of 338
Devonian Period.............. 97
Devonian Rocks, Thickness..221-3
DeWitt Fuel Co. Mine (148). 731
DeWitt Fuel Co., Production.. 377
DeWitt Mine, Production..... 377
Diamond and Forest Hill Colliery Co.................... 526
Diamond Mine (45).......... ....495, 525-6, 538, 872, 878
Diamond Mine, Production... 378
Dickinson, John Q., No. 1 Well (30) 341A, 364, 372
Dickinson, John Q., No. 2 Core Test (1)..............388A, 389
Dickinson, J. Q..............388A
Digby Mine (47).....530, 872, 878
Dilworth, J. B............830, 831
Dimmock Mine (197)..818, 877, 880
Dingess Coal................ 102, **246**, 249, 287, 289, 925, 926, 927, 928

Page.

Dingess Limestone.......... 102, 112, 113, 114, 115, 117, 118, 243, 246, **247-8,** 249, 279, 281, 282, 283, 284, 285, 288, 289, 386, 925, 926, 927, 928
Dingess Sandstone...926, 927, 928
Dingess Section, Mingo County, Revised..............926-7
Dingess Shale.............. ....247-8, 925, 926, 927, 928
d'Invilliers, E. V..........830, 831
Discharge, Estimated Monthly, New River at Fayette... ....53, 55, 58
Discharge Measurements:
 Gauley River at Belva...... ...,68, 69, 70, 71, 72, 73, 74, 75
 Kanawha River at Montgomery 41
 Kanawha River, Leakage, at Montgomery 42
 Meadow River at Russellville.....76, 77, 78, 80, 82, 83
 New River at Fayette...... 44, 47, 48, 49, 50, 52, 53, 55, 59, 61, 62, 63, 66
Distribution and Range of Fossils 281-2
Divide Section..........177-8, 221
Division Line Between Kanawha and New River Groups, Correction........99-100
Dixon, Fred.................. 726
Dixon, Samuel................ 726
Dogwood Creek.............34, 39
Dogwood Ridge Section...... 88
Dooley, D. S................. 630
Dorothy Limestone and Shale. 105, 148, 171, **270,** 280, 281, 282, 283, 284, 285
Dosier, Alexander, Opening (270) 460
Dotson (Bearwallow Conglomerate) Sandstone........... 106, 138, 142, 143, 149, 155, 157, 159, 164, 167, 172, 183, 185, 186, 188, 189, 192, 193, 195, **271-3,** 274, 275, 296, 344, 350, 366, 663, 670, 671, 674, 910
Dotson Sandstone, Lower..... 106, 149, 159, 165, 167, 172, 173, 187, 188, 189, 193, **274-5,** 278, 344, 417, 432
Douglas "A" Coal....106, 149, **273**
Douglas Coal, Lower......... 88, 89, 106, 184, 188, 193, 274, 275, 276, **276-8,** 295, 296, 297, 299, 344, 370, 386, 407, 412, 425, 427, 432, 674
Douglas, L. B. 789, 790
Douglas (Kidd) Coal......... 88, 89, 106, 112, 149, 164, 166, 167, 172, 173, 184, 186, 194, 195, 267, **273-4,** 276, 375, 386, 398, 402, 470, 670, **672-6, 867, 875**
Douglas Shale............... 106, 174, 183, **275,** 277, 278, 280, 281, 282, 284, 906
Dowdy Creek...............36, 39
Drainage Basins.............37-83
Drainage Basins, Area.......38-39
Drainage Basins, Area by Districts 37
Draper Coal......(See Alma Coal)
Dubree Mine (119)........... 696-7, 875, 879, 885, 895, 897, 898
Dubree Mine, Production..... 379
Dunbar Oil & Gas Co........ ....341, 341A, 343, 344
Dunbar, S. M................. 344
Dun Glen Mine, Production... 378
Dunglen Coal Co., (McKell Estate) Fire Creek Mine (193)..............813, 877, 880
Dunglen Coal Co. Sewell Knob Mine (145)................ ....728-9, 876, 879, 888, 895
Dunloup Coal & Coke Co. Mine (164)..........767, 879, 897, 898
Dunloup Coal & Coke Co. Mine (166) 770
Dunloup Creek..............35, 39
Dunloup Mine (165).......... ....767-9, 890-1, 895
Dunn Loup Coal & Coke Co., Production 377
Dunn Loup Nos. 2, 3, 4, 5, & 6 Mines, Production......... 377
Durrett, J. R............55, 56, 60
Dwyer, J. W................ 852
Dwyer, J. W., Mine (222).... ......202, 327, 850, 852, 877, 880

E

Eagle "A" Coal..104, **259,** 627, 644
Eagle By-Products Coal Co. Mine (61A)......605-6, 873, 878
Eagle By-Products Coal Co. No. 1 Mine (84A).638-9, 874, 879
Eagle Coal Co., Production....377
Eagle Coal Co., Straughan Mine (74)........623-4, 874, 878
Eagle Coal, Little............ 88, 104, 121, 122, 127, 134, 138, 139, 143, 148, 149, 150, 151, 152, 154, 155, 157, 159, 161, 162, 163, 164, 165, 167, 173, 182, 183, 185, 186, 188, 261, **262-3,** 375, 386, 470, 627, 628, 629, 646, **647-658, 867, 874**
Eagle Coal, Little, Roof Shale 280, 281, 282, 283, 285
Eagle Coal, Roof Shale...... ....279, 281, 282, 284
Eagle Limestone............. 88, 89, 105, 148, 149, 152, 154, 155, 157, 159, 182, 183, 186, 188, 192, 194, 237, 239, 260, 262, **263-5,** 266, 268, 280, 281, 282, 283, 284, 386, 629

Page.
Eagle (Middle War Eagle, Mohawk) Coal................ 88, 89, 104, 119, 121, 122, 123, 124, 127, 128, 131, 134, 136, 138, 139, 141, 145, 148, 149, 150, 151, 154, 155, 159, 161, 162, 163, 164, 165, 167, 171, 173, 185, 186, 188, 190, 191, 194, 237, 239, 257, 258, 259, **260-1,** 262, 263, 264, 266, 343, 351, 354, 367, 368, 371, 375, 386, 388A, 391, 392, 393, 394, 395, 398, 470, 507, 511, 538, 545, 546, 547, **613-647,** 654, 656, 657, **867, 873-4**
Eagle Mine, Production...... 377
Eagle No. 1 Mine (Christian), Production 377
Eagle No. 1 Mine (Loup Creek), Production......... 378
Eagle—½ Mile South Section 146, 221
Eagle "Rider" Coal......191, 398
Eagle Sandstone............ 104, 123, 129, 141, 154, 163, 165, 167, 186, 194, **259-260,** 368, 392, 393, 394, 395, 622
Eagle Shale.................. 88, 89, 105, 129, 130, 131, 138, 139, 141, 143, 148, 149, 151, 155, 157, 164, 167, 171, 173, 182, 183, 185, 186, 189, 191, 194, 237, 239, 260, 262, 263-5, 266, 268, 272, 280, 283, 284, 285, 350, 362, 641, 655
Early, B. H., No. 1 Well (31) 341A, 348, 364, 370-1, 905
East Lynn Sandstone........ 88, 99, 114, 115, 116, 117, 118, 119, 124, 144, 145, 146, 147, 158, 226, **227-8,** 232, 235, 236, 307, 460, 467, 910
East Lynn Sandstone, Upper. 88, 99, 114, 116, 118, 119, 124, 135, 136, 144, 145, 146, **225, 226,** 227, 228, 361, 467, 910
East River, Indicated Horse-Power Developed by...... 919
Eccles Quadrangle, Levels.... 937
Echo Coal & Coke Co........ 817
Echo Coal & Coke Co. Echo Mine (196)................ ..198, 199, 817, 877, 880, 892, 895
Echo Mine (177)............. 784
Echo Mine (196)............. ..198, 199, 817, 877, 880, 892, 895
Echo Mine, Production....... 377
Eckman Sandstone........... ...110, 199, 210, 218, **327-8,** xxix
Economy Coal Co............ 623
Edgewater No. 1 Mine (76)... ....625-6, 874, 878, 881, 882
Edgewater No. 2 Mine (43).. ....522, 524, 872, 878
Edgewater No. 2 Mine, Production 378

Page.
Edmonds, R. W.............. 501, 502, 503, 505, 507, 508, 509, 510, 512, 522, 523, 524, 526, 529, 530, 557, 617, 618, 684, 685, 686, 688, 689, 691, 692, 693, 694, 696, 697, 698, 700, 706, 707, 709, 711, 712, 714, 715, 717, 721, 731, 733, 734, 738, 739, 747, 748, 764, 767, 770, 772, 776, 778, 788, 810, 811, 817, 821, 822, 824, 825, 826, 828, 829, 831, 832, 833, 836, 837
Eighteenmile Creek, Indicated Horse-Power Developed by 919
Electric Power, Cost....... 921-2
Electro Metallurgical Co...... 40
Electro Metallurgical Co., Kanawha Works............913-14
Elevations:
  Alaska 929, 944
  Albion 940
  Aldrich Camp.............. 943
  Ansted 932
  Arthurs 934
  Ballahack 931
  Barksdale 929
  Beckwith 940
  Bedford 932
  Bells Creek................ 932
  Bellwood 934
  Belmont 930
  Belva 932, 939
  Bentree 932
  Beury 929, 945
  Peurytown 933, 941
  Beurytown Mine............. 933
  Big Fork................... 935
  Big Q...................... 930
  Big Sewell Mountain....... 946
  Bishop 933
  Black Cat.................. 930
  Boggs Knob................. 946
  Boomer 933, 944
  Boone 931
  Brooks 929
  Brown 931
  Brownwood 930
  Burdette Creek............. 934
  Burnwell 932
  Cabin Creek Junction...... 930
  Camp No. 1................. 946
  Camp Seven Switchback.... 933
  Cannelton 933, 944
  Caperton 929, 937
  Cardiff 932
  Carlisle 931
  Carnifex 945
  Carterboro 932
  Cedar Grove............... 944
  Central 929
  Cirtsville 933
  Claremont 929, 944
  Claypool 933
  Claypool Mine.............. 933
  Clear Creek................ 937
  Clifftop 934, 942, 946

Page.

Elevations:
- Coalburg 930
- Coke Ovens..................... 930
- Consolidated 930
- Cotton Hill........929, 938, 940
- Crescent 930
- Crown Hill................ 930
- Cruikshanks Farm.......... 934
- Crusher Siding............ 934
- Cunard 931
- Danese 942
- Deepwater 930, 933, 944
- Deitz 939, 940
- Dempsey 940
- Derryhale 930, 935
- Detroit 932
- Dilly Siding............... 933
- Dimmock 929
- Dothan 933
- Dry Creek................ 934
- Dunloup 930, 935
- Dwyer 934
- Eagle 930
- East Bank................ 930
- East Sewell............... 929
- Edgewater 930
- Elmo 929, 938
- End of Track (K. G. J. & E.) 935
- Falls View............933, 938
- Fayette 929, 937, 938
- Fire Creek............929, 945
- Gamoca 938
- Gauley 929, 932, 938
- Gauley Bridge..........933, 938
- Gaymont 929
- Gilkeson's Blacksmith Shop 942
- Glade 929, 944
- Glen Ferris............933, 938
- Glen Jean..........930, 935, 936
- Graham 935
- Greencastle 932
- Greendale 932
- Green Siding.............. 934
- Griffith Siding............ 934
- Hamilton 933
- Handley 930
- Hansford 930
- Harewood 933, 938, 944
- Harvey 930, 936
- Hawks Nest...929, 931, 932, 938
- Hawley 933
- Hawley Mine Siding....... 933
- Hemlock Hollow........... 930
- [illegible] 933
- [illegible] Camp.......... 932
- Hico 939
- Hinton 929
- [illegible] 934
- Huddleston 944
- Imperial Junction........ 932
- [illegible] 934
- K. & M. Junction......... 932
- Kanawha Falls 930, 938, 941
- Keeney Creek 929, 931, 937
- [illegible] .... [illegible]

Elevations:
- Kilsyth 935
- Kincaid 943
- Landisburg 934, 942
- Lansing 939
- Laurel 930
- Lick Knob 946
- Lively 933
- Lochgelly 931
- Lock 2.................... 944
- Lock 3.................... 944
- London 933, 944
- Longacre 933, 944
- Lookout 931
- Lowerys Siding........... 934
- Lucas 940
- Macdonald 930, 935
- MacDougal 929, 931
- Mahan 932
- Maplewood 942
- Masters 931
- Meadow Creek......929, 933, 941
- Meadow Creek Switchback. 933
- Meadow Bridge.........933, 941
- Meadow Bridge Mine...... 933
- Michigan 929
- Millers Camp............. 935
- Millers Ferry............ 945
- Minden 931
- M. J. Cabin............... 931
- Montgomery 930
- Morris Creek Junction..... 930
- Morton 932
- Mt. Carbon 930, 932
- Mt. Hope..............935, 936
- Mt. Lookout............... 945
- Mucklow 932
- McCreery 937
- McKendree 929, 944
- Nallen 934
- Naylor Switchback........ 933
- Newlyn 929, 938
- Nuckolls 932
- Nuttall 929, 937
- Nuttallburg 937, 939
- Oak Hill.................. 931
- Old Gauley 930
- O'Neal 935
- Open Fork Junction........ 932
- Oswald 935
- Packs Branch............. 936
- Page 933, 943
- Page Triangulation Station 946
- Paint Creek Junction...930, 932
- Paint Triangulation Station 946
- Parral 934
- Pax 935, 937
- Pennbrook 929
- Potato Hill............... 946
- Powellton 932
- Price Hill................. 935
- Prince 929, 937, 944
- Quinnimont...929, 930, 937, 944
- Rainelle 934, 943
- Rainelle Junction......... 934

Page.
Elevations:
  Ramsey 940
  Red Ash.................... 931
  Redstar 930
  Riverside 944, 945, 946
  Robins 930
  Robson 933, 941, 943, 944
  Rush Run.........929, 931, 945
  Russellville 934, 945
  St. Clair.................... 930
  Sandstone 929
  Scale Yard................ 932
  Scarbro 931
  Sevy 934
  Sewell 929, 937, 942, 945
  Shrewsbury 944
  Silver Gap................ 933
  Sims 934, 943
  Smithers 933, 944
  South Fayette............. 931
  South Side Junction....... 930
  Springdale.....934, 941, 942, 943
  Stanaford 937
  Standard 932
  Stonecliff 929, 945
  Stuart 931
  Sturgeon Branch........... 943
  Sugar Creek Junction...... 935
  Summerlee 931
  Sun 930, 935
  Sunnyside 929, 938
  Sunset 935
  Surbaugh 934
  Tamroy 935
  Teays Siding.............. 934
  Thayer 929, 944
  Thomas 936
  Thurmond.929, 930, 931, 936, 945
  Tina 933, 941
  Tomsburg 932
  Town Creek Knob......... 946
  Tunnel Siding 935
  Turkey Knob.......... 930, 935
  Vanetta 938
  Vaughan 932
  Wacomah 932
  Whipple Junction.......... 931
  Whiteoak Junction.....930, 931
  Whitney 931
  Wilt Siding... 934
  Wingrove 931
  Wriston 940, 943
  Wyndal 938, 939
  X N Cabin................. 929
  Youngs 934
Elevations ....(See Levels Above Mean Tide)
Elevations 929-946
Elevations, Railroad.......929-935
Elevations, Secondary........ 946
Elevations, U. S. Geological Survey 936-946
Elk Ridge No. 1 Mine (60)... 154, 155, 601-2, 873, 878, 897, 898

Page.
Elk Ridge No. 2 Mine (61)... ....601, 602-3, 873, 878, 897, 898
Elkridge Nos. 1 and 2 Mines, Production 378
Elk Ridge Section........155, 221
Elk River, Selected Reservoir Site 920
Elliott, Stephen............... 74
Ellsworth, C. E..........41, 42, 66
Elmo Mine (105)....685-6, 875, 879
Elmo Mine Production........377
Elmo Mining Co. Elmo Mine (105) 685-6, 875, 879
Elmo Mining Co. Production. 377
Elswick, J. W............... 511
Elverton Mine, Production... 384
Enrollment, Preparatory Branch, W. Va. University.. 23
Ephraim Creek.............35, 38
Ephraim Creek Coal & Coke Co., Production............ 377
Ephraims Creek Coal & Coke Co., Ephraims Creek (Buffalo) Mine (203)............ ....826-8, 877, 880, 893, 895
Erskine Mine (189)..810, 877, 879
Erskine No. 2 Mine, Production 379
Estep, Philip, Opening (303B) 521
Estimated Monthly Discharge of New River at Fayette... .... 53, 55, 58
Eureka Coal Co............... 467
Eureka Coal Co. Mine No. 1 (39)...............522, 872, 878
Eureka Coal Co. Mine No. 2 (40) 523
Eureka Coal Co. Mine No. 5 (7)...............145, 146, 467
Eureka Coal Co., Mine No. 6 (41) 523
Eureka Coal Co. Mine No. 14 (6)...............466-7, 871, 878
Eureka Colliery Co........... 466
Evans Bros.................. 627
Evans No. 7 Core Test (34).. ....388A, 409-10
Evans. W. H.........172, 402, 410
Ewing, Jasper............... 831
Excelsior Mine (16)......... 485
Export Coal Co., Export Mine (209) 377, 832-3, 877, 880, 893, 895
Extension Mine (112).....196, 691
Extension Mine (113)....196, 691
Extraction Analyses, Briquets:
  Fire Creek Coal............ 844
  Sewell Coal............... ....706, 717, 724, 737, 767

F

Fairfield Well (38)..........341A
Fall, Rate and Total, of Streams 33-36
Fallrock Branch 39
Falls Creek 34, 38

Page.

Falls District:
  Area 19
  Bonds Voted for Roads.... 16
  Detailed Boring Records.389-395
  Drainage Basins, Area of..37-38
  Minable Coals............
  ....(See Minable Coals)
  Population 19
  Prospective Oil and Gas Areas 348-9
  Road Mileage 16
  Sections 113-143
  Stratified Shales.......... 906
  Well Records.........341A, 342-8
Faults, Absence of........... 96
Fauna, Fossil.............279-293
Fayette Coal & Coke Co., Fayette Mine (108)............ 687
Fayette County National Bank Building 296
Fayette Gaging Station, Description 44, 46-7
Fayette Gaging Station on New River, Records.......44-66
Fayette Journal..............
  ....19, 21, 24, 25, 26, 27
Fayette Mine, Production.... 377
Fayette Smokeless Coal Co., Production 377
Fayetteville, Description..... 21
Fayetteville District:
  Area 19
  Bonds Voted for Roads... 16
  Detailed Boring Records...
  ....404-412, xxiv-xxxii
  Drainage Basins, Area of..37-38
  Lower Douglas Coal....... 278
  Minable Coals ....
  ....(See Minable Coals)
  Oil and Gas Prospects..... 373
  Population 19
  Road Mileage 16
  Sections 180-195
  Stratified Shales 906-7
Fayetteville Land Co...388, 388B
Fayetteville—1.5 Miles Northwest Section 183-4, 222
Fayetteville Quadrangle, Levels 937-41, 945
[illegible] (Miller) Section.....
  ....89, 175, 222
Features, General (Structural) 90-91
Features, Topographic 84-85
Fern Creek 35, 38
[illegible] 912
Figure 1.—Showing Progress of Topographic and Detailed County Surveys 88
Figure 2.—Showing Location of Fayette County Area.... 14
Figure 2(a)—Map Showing Location of Core Holes of [illegible] Co. of Va...xxv

Page.

Figure 3.—Showing Approximate Intervals in Feet Between Coal Seams and Important Limestones in Allegheny Series and Kanawha Group of Pottsville........ 386
Figure 4.—Showing Approximate Intervals in Feet Between Coals of New River and Pocahontas Groups.... 387
Figure 5.—Showing Minable Middle Kittanning Coal.... 457
Figure 6.—Showing Minable No. 5 Block Coal........... 462
Figure 7.—Showing Minable Stockton Coal.............. 472
Figure 8.—Showing Minable Coalburg Coal............. 475
Figure 9.—Showing Minable Winifrede Coal............. 482
Figure 10.—Showing Minable Chilton Coal............... 486
Figure 11.—Showing Minable Cedar Grove Coal.......... 489
Figure 12.—Showing Minable Alma Coal................ 494
Figure 13.—Showing Minable Campbell Creek Coal........ 499
Figure 14.—Showing Minable Powellton Coal............ 580
Figure 15.—Showing Minable Eagle Coal............... 615
Figure 16.—Showing Minable Little Eagle Coal.......... 648
Figure 17.—Showing Minable Glenalum Tunnel Coal..... 660
Figure 18.—Showing Minable Gilbert Coal............... 664
Figure 19.—Showing Minable Douglas Coal............... 673
Figure 20.—Showing Minable Sewell Coal............... 678
Figure 21.—Showing Minable Fire Creek Coal............ 797
Figure 22.—Showing Minable No. 6 Pocahontas Coal..... 851
Figure 23.—Showing Minable No. 3 Pocahontas Coal..... 862
Fipps, A. L. 635
Fire Clay.................... 907
Fire Creek.................35, 38
Fire Creek Coal & Coke Co. Mine (194) ....
  ...219, 816, 877, 880, 881, 882
Fire Creek Coal & Coke Co., Production 377, 384
Fire Creek Coal & Coke Co., Opening (540) 816
Fire Creek Coal, Little.......
  95, 166, 169, 177, 196, 201, 204, 208, 209, 218, **320-1**, 387, 388A, 388C, 410, 417, 431, 437, 452, 455, **877**

Page.
Fire Creek (Quinnimont, Lower Beckley) Coal........... 88, 89, 109, 169, 177, 182, 196, 198, 199, 200, 201, 203, 204, 205, 206, 207, 208, 209, 211, 212, 213, 294, 318, **319-20**, 321, 350, 353, 375, 387, 388A, 388B, 388C, 414, 415, 416, 417, 418, 421, 424, 430, 431, 434, 446, 447, 448, 450, 451, 452, 453, 454, 455, 676, 717, 729, **795-849, 867, 877, 892-4, 897,** 913, xxvii, xxix, xxx
Fire Creek Collieries Co., Pennbrook Mine (195)........... 818
Fire Creek Mine (193) (Dunglen) 813, 877, 880
Fire Creek Mine (194) (Fire Creek) 319, 816, 877, 880, 881, 882
Fire Creek Mine, Production.. ....377, 384
First Salt Sand.......350, 366, 367
Fisher, C. A..........685, 715, 833
Flanagan Mine (124)........ 701
Flattop Mountain Sandstone. 109, 177, 197, 199, 294, 322, 323, **324-5,** xxvii, xxix, xxxi
Fleshman, Anderson M...854, 857
Flinn Lumber Co. Opening (454) 679, 875, 879
Flint, Charles, Opening (267) 459
Flora, Fossil................. 279
Folds, Description of........91-95
Forbes, E.................233, 467
Forbis, Riley, Opening (403) 651
Forest Conditions, Present... 923
Forests 922-4
Forests, etc., (Chapter XII) 904-924
Forests, Original............ 922
Formation 18-19
Fort Defiance Coal & Coke Co., Mine (48)........532-3, 872, 878
Fort Defiance Coal & Coke Co., Production 377
Fort Defiance Mine, Production 377
Fossil Fauna..............279-293
Fossil Flora................. 279
Fossil Horizons, Marine, Table of 279-280
Fossils, Invertebrate, from Pottsville Series..........281-2
Fossils, Range and Distribution 281-2
Fossils, Winifrede Limestone, List of Species............. 293
Foundry Tests of Coke:
  Eagle Coal................. 635
  Fire Creek Coal..........808-10
  No. 2 Gas Coal.......547-8, 573
  Sewell Coal...............762-3
Fox, Chas. D................ 857
Fox, David W., Opening (440) 667

Page.
Fox, George.............859, 860
Freeburn Coal............... .....(See Campbell Creek Coal)
Freeport Coal, Lower......99, 237
Freeport Coal, Upper.......98, 237
Freeport "Kidney" Iron Ore, Lower 99
Freeport "Kidney" Iron Ore, Upper 98
Freeport Limestone, Upper.. ....98, 237
Freeport Sandstone, Lower... ....99, 144, 225
Freeport Sandstone, Upper... 99
Freudenberger, Wm.........341A
Froehling & Robertson....... 539
Fusing Tests of Ash..481, 553, 554

G

Gage Height, Daily:
  Gauley River at Belva..... ....68, 69, 70, 71, 72, 73, 74, 75
  Kanawha River at Montgomery 42
  Meadow River at Russellville 76, 77, 78, 79, 80, 81, 82, 83
  New River at Fayette..... 45, 46, 47, 48, 49, 51, 52, 54, 56, 57, 59, 60, 61-66
Gaging Station, Description:
  Gauley River at Belva..... 68
  Kanawha River..........40-41
  Meadow River at Russellville..76, 78, 79-80, 81, 82, 83
  New River, Fayette Station 44, 46-7, 58
Gallego Land Co........388, 388A
Gallego Land Co. No. 1 Coal Test (15)................. ....166, 167, 168-9, 388A, 401
Gallego No. 1 Well (15)..... ....339, 341A, 353
Gallier Coal Co. Opening (390) 646
Gamoca Coal Co..........478, 515
Gamoca Mine (14)........... ....130, 478-9, 871, 878
Gemoca Section.........130-1, 222
Gas and Oil Horizons in W. Va. 336-8
Gas and Oil Zones in W. Va., Table 337-8
Gas-Bearing Sands, Description 338-340
Gas Development in Kanawha County, Recent.........359-372
Gas, Natural, and Petroleum (Chapter X)............336-373
Gasten, C. P.................706
Gauge Reading, Average, of Kanawha River, by Months 8
Gauge Reading, Average, of Kanawha River, by Years... 9

Page.
Gauley Branch, C. & O. R. R. 11
Gauley Branch, C. & O. R. R. Levels 932
Gauley Bridge—1 Mile Southeast Section 128-9, 222
Gauley Coal & Land Co., Diggings (545 and 546)........ 820
Gauley Mountain Coal Co.,..... ....388, 388A, 402, 574, 575
Gauley Mountain Coal Co.:
  Buck Run No. 1 Mine (34).. ....516, 872, 878
  Buck Run No. 1 Mine (35) 517, 872, 878
  Bud Blake, Lessee, Mine (310) 532
  J. A. Blake, Lessee, Mine (311) 533
  Core Test (16)........388A, 402
  Mine (37)................. 519
  Mine (52).................. 556-574, 872, 878, 881, 882, 883, 895
  No. 2 Mine (36)........... ....273, 518, 872, 878, 883, 895
  Openings (298, 299, and 300) 519
  Opening (349)............. 581
  Opening (396)............. 649
  Opening (397)............. 650
  Production 377, 384
  Prospects (369 and 370).... 621
  Tramroad Exposure (404).. 652
Gauley River...........34, 37, 39
Gauley River at Belva, Gaging Records 68-75
Gauley River at Belva, Discharge Measurements...... ....68, 69, 70, 71, 72, 74, 75
Gauley River, Description.... ....4, 67-75
Gauley River, Indicated Horse-Power Developed by........ 917
Gauley River, Selected Reservoir Site.................. 920
Gauley River Tributaries, Indicated Horse-Power Developed by.................. 918
Gaymont Coal Co., Production 377
Gaymont Colliery Co. Mine (101)...............684, 875, 879
Gaymont Mine, Production... 377
Gellatty, J. N................ 524
General Account:
  Kanawha Group.. ..230-1
  New River Group 294-5
  Pocahontas Group 323-4
General and Special Sections (Chapter IV).... 97-223
General Description,. 18-31
General Description, Allegheny Series . .224
General Description, Mauch Chunk Series 332-5
General Features (Structural) 90-91
General Section:
  Allegheny Series..........98-99
  Kanawha Group...........100-6
  Mauch Chunk Series....... 113
  New River Group.........106-9
  Pocahontas Group........109-11
  Pottsville Series..........100-11
  Pottsville Series, Revised 927-8
Geological Society of America 245, 279
Geology (Part II)..........86-335
Gilbert "A" Coal.....105, 194, **270**
Gilbert Coal................. 88, 89, 106, 131, 138, 140, 143, 149, 157, 159, 163, 167, 172, 173, 192, 194, 259, 269, 270, 271, 272, 274, 276, 370, 386, 398, 470, **662-672,** 674, **867, 875**
Gilbert Sandstone, Lower..... 105, 138, 139, 149, 155, 157, 159, 164, 167, 189, 194, 267, 268, **269,** 271, 659
Gilbert Sandstone, Upper..... 105, 139, 142, 149, 151, 153, 186, 188, 191, 194, **267-8,** 269, 350, 910
Gilbert Shale................ 105, 148, 149, 157, 159, 171, 189, **270,** 280, 281, 282, 283, 284, 285, 342
Giles, Fayette & Kanawha Turnpike 18
Gilkeson, James..........848, 856
Gill, Walter................. 528
Gilpin Coal Opening (490)... 786
Gilpin, Mrs................. 786
Glade Creek Land Co.:
  Prospect (550).. 829
  Prospect (551)...........829-30
  Prospects (552 and 553).... 830
  Prospects (555 and 556)... 831
Glade Creek of Meadow River 34, 39
Glade Creek of New River..35, 38
Glass-Sand 911-13
Glass-Sand, Analyses......... 912
Glass-Sand, etc. (Chapter XII) 904-921
Glass-Sand Quarries...214, 911-12
Glenalum Tunnel Coal...... 88, 105, 155, 157, 159, 164, 167, 171, 189, 190, 191, 194, **268-9,** 350, 372, 384, 470, **658-662, 867, 874-5**
Glendale Coal Co. Mine (211) 212, 213, 884-5, 893, 896
Glendale Colliery Co. Glendale Mine (211) 212, 213, 884-5, 893, 896
Glendale Colliery Co. Old Drift (212)................ 885
Glendale Mine (211) 212, 213, 884-5, 893, 896

Page.

Glen Ferris No. 117 Mine (29) 512, 871, 878
Glen Ferris, Water - Power Development 913-14
Glen Jean, Description....... 26
Goosetrey, Samuel........... 692
Gordon Coal & Coke Co...... 524
Gordon Sand.........338, 353, 355
Grampus Sand............... 362
Grandview—Royal Section... ....89, 209-10, 222
Grapevine Sandstone...105, **262-3**
Gravel, River and Creek..... 908
Great Kanawha Colliery Co.:
  Digby Mine (47)...530, 872, 878
  Mt. Carbon Mine (9)....... ....468, 871, 878
  Mt. Carbon No. 1 Mine (78) 627
  No. 2 Mine (46)........... ......529-30, 872, 878, 881, 882
Great Kanawha River.........2-9
Green Structure Contours... ....86-7, 254
Green Sulphur District (Summers) Well Records.341A, 356-8
Green Sulphur Oil & Gas Co.. ....341, 341A, 357
Green, Thomas...........606, 639
Greenbrier Coal Co., Greenbrier Mine (368)........... ....620, 873, 874, 878
Greenbrier County Detailed Core Test.............176-7, 404
Greenbrier County Section... 218
Greenbrier Independent...... 10
Greenbrier Limestone........ 113, 123, 125, 160, 332, 333, 336, 337, **339**, 373, 908
Greenbrier Limestone, Oil and Gas Zones................. 337
Greenbrier Limestone, Thickness 221-3
Greenbrier Mine (368)....... ....620, 873, 874, 878
Greenbrier River, Selected Reservoir Sites............. 920
Greenwood Coal Co.:
  Mud Tunnel Drift (216)... 839
  Production 377
  Slater Creek Entry (215)... ....837-9, 894, 896
  Slater Hollow Drift (214).. ....837, 877, 880, 881, 822
Greenwood Mine, Production. 377
Grimsley, G. P.............. 904
Grisinger, J. C.............. 514
Grove, J. W................. 618
Grover, N. C................. 56
Groves, J. W.. .... 543, 631, 772, 816, 825, 827, 834, 838, 840, 844, 845, 846
Guyandot Sandstone......... 88, 89, 107, 128, 129, 134, 137, 168, 172, 174, 175, 176, 178, 179, 180,

Page.

Guyandot Sandstone.......... 181, 184, 187, 195, 196, 200, 201, 204, 305, **307**, 314, 344, 345, 350, 353, 354, 365, 366, 367, 369, 370, 371, 396, 399, 403, 405, 406, 408, 409, 411, 418, 419, 420, 422, 423, 424, 425, 426, 427, 428, 429, 432, 433, 435, 436, 437, 442, 443, 444, 445, 738, 770, 910, xxvi, xxviii, xxxi, xxxii
Guyandot Sandstone, Lower.. 108, 143, 168, 175, 176, 178, 179, **309-10**, 405, 409, 410, 411, 414, 415, 418, 422, 423, 426, 427, 428, 432, 435, 437, 439, 441, 442, 446, 681, 910, xxvi, xxvii, xxviii, xxxi, xxxii
Gwinn, H. L., Prospect (258). 313
Gwinn No. 1 Well (17B) 341A, 357-8
Gwinn, Ottaway.............. 313
Gwinn, Samuel, Opening (224) 214, 859, 860, 877, 880

H

Hacketts Coal Co. Mine..117, 118
Hagan, A. M................. 347, 460, 469, 474, 480, 483, 487, 491, 497, 549, 550, 552, 555, 578, 605, 606, 607, 608, 609, 637, 638, 639, 640, 641, 642, 647, 657, 661, 671, 676, 782, 795, 849, 860, 866
Hall, W. F...............203, 852
Halstead, Squire.........138, 680
Halstead, Squire, Opening (457) 680
Hamilton, W. T., Opening (439) 667
Handley Syncline.........360, 364
Hansford, Morris............ 466
Hardee District (Mingo) Sections 286-9
Harewood Mine No. 115 (25A) ..509, 871, 878, 881, 882, 897, 899
Harewood—¼ Mile Northwest Section 124, 222
Harmon, T. C................ 826
Harrah, C. C................ 650
Harrah, C. C., Opening (399).. 650
Harrah, C. C., Opening (427). 663
Harrah, Lawrence, Opening (402) 651
Hart, J. W.................. 813
Hartridge Black Shale....... 108, 142, 181, 239, **310**, 409, 418, 422, 423, 425, 426, 427, 429, 435, 437, 439, 441, 422, xxvi, xxvii, xxviii, xxxi, xxxii
Harvey Coal & Coke Co.:
  Harvey Mine (152)......... 377, 733-4, 876, 879, 881, 882, 888, 895
  Production 377

Page.
Harvey Conglomerate Sandstone ... 88, 89, 107, 140, 168, 172, 178, 179, 181, 184, 187, 191, 201, 242, **304-5,** 344, 345, 350, 353, 354, 365, 366, 367, 384, 390, 391, 399, 405, 406, 407, 408, 409, 411, 412, 417, 418, 419, 422, 423, 424, 425, 426, 427, 428, 429, 431, 435, 436, 437, 438, 439, 441, 442, 445, 910, xxvi, xxvii, xxviii, xxxi, xxxii
Hatfield Tunnel Coal ... (See Powellton Coal)
Havener, H. C., No. 1 Well (8) ... 339, 341A, 345-6
Havener, H. C., No. 2 Well (9) ... 338, 341A, 343, 349
Havener, O. F., No. 1 Well (6) ... 135, 136
Hawkins, E. B., Opening (416) 655
Hawkins, Joseph, Opening (433) ... 665
Hawkins Land Co. ... 188, 388A, 404, 409, 411
Hawkins Land Co.:
  Coal Test No. 1 (28) ... 388A, 411-12
  Coal Test No. 8 (29) ... 182, 183-4, 388A, 405-6
  Coal Test No. 9 (38) ... 185, 186-7, 388A, 413
Hawks Nest—Ansted Section ... 88, 170-2, 221
Hawks Nest Branch, C. & O. R. R. Levels ... 932
Hawley, E. L. ... 823
Hawver, Geo. ... 388A, 669
Hawver, Geo., Opening (370) ... 669, 875, 879
Hawver, Geo., Water Well (17) ... 388A, 401
Hawver, Wm. E., Openings (442 and 443) ... 668
Haynes, J. B. ... 291
Hazlewood, A. M. ... 645
Hazlewood, A. J. ... 685, 686, 694, 700, 719, 720, 721, 727, 728, 738, 740, 741, 743, 744, 745, 749, 768, 779, 816, 822, 830, 840
Heating Value of Gas ... 541
Hedgehog Creek ... 39
Hemlock Hollow Coal & Coke Co.:
  Drift Opening (562) ... 847
  Hemlock Mine (217) ... 778, 839-844, 854, 886
  Production ... 878
Hennen, Ray V. ... 88, 127, 232, 237, [illegible], 243, 244, 245, 247, 250, 251, 252, 256, 259, 261, 263, 265, 266, 267, 270, 271, 277, 287, 288, 301, 307, 311, 321, 332, 344, 345, 347, 398, 399, 409, 413, 422, 439, 455, 444
Henry, C. [illegible] ... 62, 64, 65
Henry, Earl A. ... 375
Herbert Collieries Co. ... 644
Herbert Collieries Co.—Mine (90) ... 194, 644-5, 874, 879, 884, 895
Herberton Mine (90) ... 194, 644-5, 874, 879, 884, 895
Herberton (Willis Branch) Section ... 88, 89, 193-5, 222
Herndon, W. L. ... 788
Hernshaw (Black Band) Coal 102, 114, 117, 136, 137, 141, 153, 156, 162, 167, 171, 191, 245, **246-7,** 287, 386, 389, 393, 926, 927, 928
Hernshaw Sandstone ... 102, 156, **245,** 287, 926
Hess, Charles, Opening (428). 663
Hess, J. H. ... 680
Hickory Camp Mine (80) ... 636-7, 874, 878
Hickory Camp Section ... 88
Highways ... 15-18
Hill and Long Mine (366) ... 620
Hill and Long Mine (367) ... 621
Hill-Long No. 1 Well (6A) ... 341A, 344, 349
Hill-Long No. 2 Well (7) ... 341A, 343-4
Hill, Major, Estate, Opening (295) ... 513
Hill Top, Description ... 25-26
Hinson Coal Co., Production 378
Hinton Limestone, Upper ... 335
Hinton Quadrangle, Levels ... 946
Historical and Industrial Development (Chapter I) ... 1-31
History and Physiography (Part I) ... 1-85
History of W. Va., Semi-Centennial ... 9, 16, 915
Hite, B. H. ... 264, 301, 306, 320, 322, 466, 468, 477, 501, 502, 503, 505, 507, 508, 509, 510, 512, 517, 518, 522, 523, 524, 526, 529, 530, 539, 549, 550, 552, 556, 557, 582, 605, 606, 607, 608, 609, 618, 620, 624, 625, 626, 628, 639, 640, 641, 642, 649, 651, 659, 661, 668, 669, 679, 680, 681, 684, 685, 686, 688, 689, 693, 694, 696, 700, 703, 704, 705, 706, 707, 709, 711, 712, 714, 715, 717, 721, 731, 733, 738, 739, 745, 747, 748, 764, 767, 770, 772, 776, 778, 782, 786, 787, 788, 791, 810, 811, 814, 816, 817, 818, 820, 822, 824, 825, 827, 828, 829, 831, 832, 833, 836, 837, 852, 858, 860, 865, 869, 912
Hoke, N. E. ... 701
Holdren, A. P., Opening (272) 463
Holiday Coal & Coke Co. ... 689
Homewood (Roaring Creek) Sandstone ... 99, 100, 114, 116, 120, 122, 124, 125, 126, 130, 131, 133, 134, 144, 147, 158, 166, 224, 230, **231-2,** 233, 237, 238, 287, 533, 910

Page.
Hominy Creek, Indicated Horse-Power Developed by 918
Honey Branch................ 38
Horizons, Oil and Gas, in W. Va. 336-8
Horizons, Table of Marine Fossil 279-280
Horse-Power, Indicated, Developed by:
 Gauley River.............. 917
 Gauley River Tributaries.. 918
 New-Kanawha River........ 916
 New-Kanawha River, Minor Tributaries 919
Horseshoe Creek...........34, 39
Horseshoe Creek, Mouth of, Section 137, 222
Horton, A. H................ ....41, 59, 61, 63, 70, 915, 921
Hotchkiss 329
House Branch of Bells Creek Section 136-7, 222
Howard Colliery Co., Frederick Mine 286, 287
Hoyt, W. G..................59, 76
Hubard, R. T., Jr............ 417
Huddleston, E. E............. 829
Hughes Ferry (Iaeger) Coal. 88, 89, 107, 129, 143, 159, 168, 172, 177, 181, 203, 276, 297, 298, 299, **299-303,** 304, 344, 352, 353, 354, 366, 367, 387, 388A, 388B, 396, 397, 399, 402, 405, 407, 408, 409, 411, 414, 417, 419, 420, 425, 426, 427, 428, 432, 436, 441, 680, **875**
Huling et al.................388C
Huling et al. Core Tests:
 No. 1 (148) 388C, 453-4
 No. 2 (146) 388C, 452
 No. 3 (144) 388C, 450-1
 No. 4 (147) 388C, 453
 No. 5 (143) 388C, 449-50
 No. 6 (149) 388C, 454
 No. 7 (145) 388C, 451
Huling, Jas. H., Prospect (554) 830-1
Humbert, F. U...............xxiv
Humphreys, D. C............ ....45, 47, 48, 49, 50, 52, 53
Huntington, A. D., Wells:
 No. 1 (19) 341A, 365
 No. 2 (22) 341A, 364, 368-9
 No. 3 (20) 339, 341A, 366-7
 No. 4 (23) 341A, 369-70
 No. 5 (21) 341A, 364, 367-8
 No. 6 (24) 341A, 372
Huntington, Collis P......... 10
Hurley, J. E................. 855
Hurley, P. T., Opening (578) 855
Hurt, W. M.................. 839
Hurte, Calvin, Opening (473) 730
Hutsenpiller, Bert, Opening (577) 855
Hydro-Electric Power Commission 921

I

Iaeger "A" Coal......107, 299, 302
Iaeger "B" Coal............ 160, 295, **297,** 387, 400, 401, 402, 409, 426, 439
Iaeger (Hughes Ferry) Coal.. 88, 89, 107, 129, 143, 159, 168, 172, 177, 181, 203, 276, 297, 298, 299, **299-303,** 304, 344, 352, 353, 354, 366, 367, 387, 388A, 388B, 396, 397, 399, 402, 405, 407, 408, 409, 411, 414, 417, 419, 420, 425, 426, 427, 428, 432, 436, 441, 680, **875**
Iaeger Coal, Lower........... 107, 181, 184, 187, 299, **303,** 304, 387, 404, 406, 410, 422, 425, 426, 439, xxvi, xxviii, xxxi, xxxii
Iaeger Sandstone, Lower.... ....107, **303,** 304
Iaeger Sandstone, Middle..... ....107, 187, **303,** 422, 425
Iaeger (Lower Nuttall) Sandstone, Upper.............. 88, 89, 107, 129, 130, 137, 138, 140, 142, 159, 165, 167, 172, 174, 175, 177, 178, 179, 180, 181, 184, 187, 192, 195, 274, 278, 295, **297-9,** 300, 301, 302, 303, 304, 305, 345, 347, 350, 352, 353, 354, 362, 365, 366, 367, 369, 370, 371, 396, 397, 398, 399, 400, 402, 404, 405, 406, 407, 408, 409, 410, 411, 412, 417, 419, 420, 421, 422, 425, 426, 427, 428, 429, 432, 435, 436, 438, 439, 441, 680, 906, 910, 911, 913, xxiv, xxvi, xxviii, xxxi, xxxii
Iaeger Shale, Lower...107, 304, 907
Iaeger Shale, Upper.......... 107, **299,** 304, 399, 406, 407, 410, 422, 427, 428, 441
Illuminating-Gas Tests....539-543
Imperial Coal Co. No. 11 (912) Well (37)...........341A
Indian Creek, Indicated Horse-Power Developed by....... 919
Indian Gap (Winifrede) Limestone 101, 120, 190, 192, **243-4,** 279, 281, 282, 283, 284, 285, **286-293,** 386
Indicated Horse-Power Developed by:
 Gauley River.............. 917
 Gauley River Tributaries.. 918
 New-Kanawha River....... 916
 New-Kanawha River, Minor Tributaries 919
Industrial and Historical Development (Chapter I).... 1-31
Industries and Towns........21-29

Page.
Industry, Lumber ....[illegible]
Intervals Above and Below No. 2 Gas Coal 88
Intervals Above and Below Sewell Coal 89
Intervals Between Coal Seams, Allegheny and Kanawha... 184
Intervals Between Coal Seams, New River and Pocahontas. 187
Introduction (Chapter IV)...87-88
Invertebrate Fossils from Pottsville Series, List of..281-2
Iron Ore, Lower Freeport "Kidney" 93
Iron Ore, Upper Freeport "Kidney" 98
Island Creek Coal............ (See Cedar Grove Coal)
Items, Miscellaneous 18-29

J

Jacks Branch Oil & Gas Co... ...341, 341A, 346
Jackson, H. J....41, 59, 61, 63, 69
Jackson, J. M 144
James River & Kanawha Turnpike 16-18
Jarrett Branch 58
Jeffers, Thos. E..............3, 4
Jefferson District (Nicholas) Well Records.......341A, 342-6
Jenkins, A. J................ 502
Jenkins, Lee 581
Jenkins, Noah, (Beckley) Coal 813
Johnson Fork, Head of Section 162, 222
Johnson, Frank, Mine........ 141
Johnson, W. R., Coal Co.:
No. 1 Mine (60)............ .587, 616, 867, 868, 881
Production 879
Johnson, W. R., Core Test (6) 388A, 397-8
Johnson, W. R., Crescent Mine (1) 227, 458
Johnson, W. R., Crescent Mine (2) 464, 871, 878
Johnson, W. R., Mine (42) 345, 526, 872, 878
Johnson, W. R., Mine (24) 587, 616, 871, 878
Johnson, W. R., No. 1 Mine (77) 145, 624-5, 874, 878, 881, 882
Jonah, A. R. 770
Jones Heritage 734
Jones, C. H. 777
Jones, Clyde, Opening (492) .. 786
Jones Mines (133) [illegible]
Jones, Geo. W. 734
Jones, H. C. 144, 306, 616, 617
Jones, I. C. 823
Jones Mine (146) 726
Jones Nos. 2 and 3 Mines, Production 879
Jordan-Amick, John, Core Test (57) 388B
Journal of Association of Engineering Societies.......... 45

K

Kanawha & Hocking Coal & Coke Co.:
Mine (70).................. 616
Mine 111 (17)............... ....591, 871, 878, 881, 882
Mine 112 (18).............. 592
Mine 114 (25).............. 597-8, 871, 878, 881, 882, 883, 895
Mine 115 (25A)............ 598, 871, 878, 881, 882, 897, 899
Mine 116 (71)..........124, 617
Opening (2)............124, 461
Well No. 1 (13A)....341A, 347-8
Kanawha & Michigan R. R.... 13
Kanawha & Michigan R. R.:
Exposure (31)............. ....122, 449, 651, 874, 879
Levels, Main Line 935
Prospect 142
Prospect (458)......681, 875, 879
Kanawha Black Flint........ 88, 101, 114, 115, 116, 117, 118, 119, 120, 122, 124, 125, 126, 130, 131, 133, 135, 136, 144, 146, 147, 152, 156, 158, 170, 225, 226, 232, **233-4**, 235, 236, 238, 241, 243, 257, 279, 280, 282, 300, 367, 386, 390, 454, 460, 461, 463, 464, 465, 466, 467, 471, 475, 476, 478, 505, 533
Kanawha County:
Detailed Core Tests........ ....389-90, 397-8
Elevations..........930, 932, 933
Recent Oil and Gas Development 359-372
Sections.......114, 116, 118, 119
Well Records.....341A, 359-372
Kanawha County Report..... 2, 4, 91, 116, 251, 281, 340, 360, 364
Kanawha District:
Area 19
Detailed Boring Records 395-401
Drainage Basins Area 37-38
Lower Douglas Coal 277-8
Minable Coals ....(See Minable Coals)
Population 19
Prospective Oil and Gas Areas 355
Road Mileage 16
Sections 144-169
Well Records 341A, 350-5

Page.
Kanawha Falls (30′) Quadrangle, Levels.....937-41, 943-4
Kanawha Falls Section. 88
Kanawha-Gauley Coal ⅞ Coke Co. No. 1 Well (10).................122, 123-4, 341A, 346
Kanawha, Glen Jean & Eastern R. R.................. 15
Kanawha, Glen Jean & Eastern R. R.:
  Main Line, Levels......... 935
  Sugar Creek Branch, Levels 935
Kanawha Group.............. 97
Kanawha Group:
  Age 279-293
  Chapter VI.............230-293
  Correction in Division Line Between New River Group 99-100
  Description of Members.........................231-278
  General Section.........100-106
  Minable Coals...........470-676
  Revision in Correlation, Mingo County...........925-8
  Table of Marine Fossil Horizons 279-280
  Thickness 221-3
Kanawha-New River, Indicated Horse-Power Developed by 917
Kanawha-New River, Indicated Horse-Power Developed by Minor Tributaries of... 919
Kanawha Rail & River Coal Co.:
  Diamond Mine (45).............495, 525-6, 538, 872, 878
  Edgewater No. 1 Mine (76) 625-6, 874, 878, 881, 882
  Edgewater No. 2 Mine (43) 522, 524, 872, 878
  Mecca Mine (38)..521-2, 872, 878
  Production 378
Kanawha River.........33, 37, 38
Kanawha River:
  At Lock No. 2, Montgomery 40-42
  Average Gauge Reading by Months 8
  Average Gauge Readings by Years 9
  Basin, Selected Reservoir Sites 920
  Days Navigation Suspended. 4
  Description 2-9, 39-42
  Locks and Dams........... 3
  Maximum Stages........... 6
  Minimum Stages........... 7
Kates Creek.................. 39
Kay Moor No. 1 Mine, Production 378, 384
Kaymoor Mine (130)......... 707-8, 875, 879, 881, 882, 886, 895

Page.
Keefer Coal Land Co...................388, 388A, 406, 407, 408
Keefer Coal Land Co.:
  No. 1 Core Test (30)..388A, 406
  No. 2 Core Test (31).........................388A, 407-8
  No. 3 Core Test (32)..388A, 408
Keeferton—½ Mile West Section 164-5, 222
Keenan, Peter, Mine.......... 141
Keener Sand.................. 135, 337, 338, 339, 341, 345, 346, 348, 361, 368, 371
Keeney Creek...............35, 38
Keeney Creek Branch, C. & O. R. R......................... 12
Keeney Creek Branch C. & O. R. R., Levels............... 931
Keeneys Creek Colliery Co.....................388, 388A, 689
Keeneys Creek Colliery Co.:
  Brackens Creek Mine (179) 784
  Lower Boone Mine (115)..........692-3, 875, 879, 885, 895
  Mine (462)................. 702
  Production 378
  Smokeless Mine (120)..........697-700, 875, 879, 885, 895
  Smokeless Mine (121)....... 700
Keeneys Creek Mine (110)............689-90, 875, 879, 884, 895
Kelly, W. S.................. 644
Kent, M. E................... 763
Kentucky Geological Survey.. 245
Key-Rocks 86-87
Keystone Coal............... 111
Keystone Coal Co........... 388A
Keystone Coal Co. Core Test (12) 388A, 397-8
Keystone Coal Co. No. 1 Well (29) 341A, 364, 371-2
Keystone Sandstone.......... 111
Kidd Coal.....(See Douglas Coal)
Kidd, Lewis, Coal Opening (98) 195, 267, 274, 672, 675-6, 875, 879
Kilbourne & Jacobs:
  Prospects (288 and 289)... 495
  Prospects (290 and 291)... 496
  Prospects (307 and 309)... 531
Kilsyth Nos. 1 and 2 Mines, ...778-9, 876, 879, 891, 895
Kilsyth Nos. 1 and 2 Mines, Production 378
Kimberly Mine (49).............151, 526-7, 528, 538, 872, 878
Kimberly No. 3 Mine, Production 378
Kimberly Section.......150-1, 222
Kincaid & Conley Opening (92) 651, 874, 879
Kincaid, Leslie, Opening (519) 793

Page.
Kincaid, Opening (Boone Coal Co.) (451)........ 671
Kincaid, P........ 602
Kingston—1.7 Miles West Section 165, 222
Kingston Section...88, 166-9, 222
Kittanning (No. 5 Block) Coal, Lower ....
88, 99, 114, 115, 116, 117, 118, 119, 124, 135, 144, 146, 147, 152, 158, 166, 170, 226, 227, **228-9,** 232, 234, 375, 386, 456, 458, 460, **461-9,** 867, 871
Kittanning (North Coalburg) Coal, Middle........
88, 99, 114, 115, 116, 117, 118, 119, 124, 136, 144, 146, 225, **226-7,** 228, 375, 386, 455, **456-61,** 463, 464, 465, 867
Kittanning Coal, Upper......
88, 99, 136, 144, 146, **225,** 226, 227, 238, 386, 459
Kittanning Limestone, Lower 238
Kittanning "Rider" Coal..... 99
Kittanning Sandstone 99, 229
Kittanning Sandstone, Lower 238
Konrad, Philip........396, 532
Krak, J. B........
264, 301, 306, 320, 322, 517, 518, 549, 550, 552, 556, 605, 606, 607, 608, 609, 620, 638, 639, 640, 641, 642, 649, 651, 659, 661, 668, 669, 679, 681, 703, 704, 782, 786, 787, 791, 814, 852, 858, 860, 865, 869, 912
Krebs, C. E........
2, 15, 91, 113, 115, 116, 133, 162, 166, 182, 185, 192, 227, 242, 249, 251, 254, 255, 261, 270, 315, 326, 335, 340, 344, 347, 348, 356, 359, 389, 397, 398, 399, 400, 403, 404, 406, 407, 408, 409, 411, 443, 444, 445, 533, 534, 535, 536, 537, 548, 549, 552, 554, 605, 636, 638, 659, 661, 668, 669, 679, 680, 781, 782, 814, 828, 829, 830, 831, 904, 925
Krebs, G. R........829, 830, 831

L

"L"........ 341
Lack of Test Wells in Nuttall, Sewell Mountain and Quinnimont Districts........355-8
Lackawanna Coal & Lumber Co 341, 341A, 342, 343
Lackawanna Coal & Lumber Co.:
  Well (1)....341A, 342, 348, 349
  Well (3)........341A, 342-3
  Well (4)........341A, 343, 349
  Well (34) 341A
  Well (39) 341A
Lacy, Gertrude, Opening (601) 865
Laing, J. E. 123, 125

Page.
Laing, John B........ 555
Laing, Thos........ 612
Laing, T. K........ 555
Lancaster, Geo. T........ 913
Landgraff Coal........ 111
Landgraff Sandstone........ 111
Lathrop, W. A........328, 329, 330
Laura Mine.....378, 737-8, 888, 895
Laura Mining Co., Laura Mine (154)........378, 737-8, 888, 895
Laura Mining Co., Production 378
Laurel Branch of New River 38
Laurel Creek Branch, C. & O. R. R........ 12
Laurel Creek Branch, C. & O. R. R., Levels........930
Laurel Creek Coal Co. Mine (210)....833-4, 877, 880, 893, 895
Laurel Creek Coal Co., Production 378
Laurel Creek Land Co........ 840
Laurel Creek Mine (210).....
........833-4, 877, 880, 893, 895
Laurel Creek of Gauley River
........34, 39
Laurel Creek of Meadow River
........34, 39
Laurel Creek of New River..
........35, 36, 38, 39
Laurel Mine, Production..... 378
Lawton—½ Mile Southwest Section 89, 213, 222
Lawton Syncline........93-4, 358
Layland No. 1 Mine (218)....
........844-5, 894, 896, 897, 899
Layland No. 2 Mine (219)....
........845-6, 894, 896, 897, 899
Layland No. 3 Mine (220)....
........846-7, 894, 896, 897, 899
Layland Nos. 1, 2, 3, and 4 Mines, Production........ 378
Lee Branch........ 38
Length of Streams........33-36
Lesley, J. P........225, 228
Levels ....(See Elevations)
Levels Above Mean Tide (Appendix "B") 929-946
Levels, Railroad........929-935
Levels, U. S. Geological Survey 936-946
Levels:
  Beckley Quadrangle........936-7
  Eccles Quadrangle........ 937
  Fayetteville Quadrangle...
  ....937-41, 946
  Hinton (30′) Quadrangle... 946
  Kanawha Falls (30′) Quadrangle........937-41, 943-4
  Meadow Creek Quadrangle..941-3
  Montgomery Quadrangle..943-4
  Raleigh (30′) Quadrangle..
  ....944-5, 946
  Winona Quadrangle........945-6
Lewis et al., Opening (215).. 306

Page.
Lewis, General Andrew.....22, 24
Lick Branch Mine, Production 379
Light, Henry, No. 5 Core Test (28) 388A, 404
Lightner, J. T............... ......449, 450, 451, 452, 453, 454
Limestone 908
Limestone:
  Brush Creek............... 283
  Buffalo Creek.......240, 286-293
  Campbell Creek............ 252
  Cannelton (Stockton)......257-8
  Dingess 247-8
  Dorothy 270
  Eagle 263-5
  Greenbrier (Big Lime)......339
  Lower Kittanning.......... 238
  Lower Mercer..........233, 235
  Marsh Fork................ 148
  Oceana 268
  Seth 249
  Stockton (Cannelton)......257-8
  Terry 335
  Upper Freeport..........98, 237
  Upper Hinton.............. 335
  Vanport 238
  Winifrede (Buffalo Creek).. ....240, 286-293
  Winifrede (Indian Gap)... ....243-4, 286-293
Lingula Fossils.............. 675
Lingula lemniscata Price..... 289
List of Invertebrate Fossils from Pottsville Series.....281-2
List of Species..............292-3
Little Alma Coal.........103, **252**
Little Cedar Coal............ 105, 143, 186, 191, 194, **265,** 386
Little Chilton Coal........... ......102, 167, **245,** 287, 288, 393
Little Coalburg Coal......... ......101, 118, 166, 190, **240,** 386
Little Eagle Coal............ 88, 104, 121, 122, 127, 134, 138, 139, 143, 148, 149, 150, 151, 152, 154, 155, 157, 159, 161, 162, 163, 164, 165, 167, 173, 182, 183, 185, 186, 188, 261, **262-3,** 375, 386, 470, 627, 628, 629, 646, **647-58, 867, 874**
Little Eagle Coal, Roof Shale 280, 281, 282, 283, 285
Little Fire Creek Coal....... 89, 109, 169, 177, 196, 201, 204, 208, 209, 218, **320-1,** 387, 388A, 388C, 416, 417, 431, 447, 452, 455, **877**
Little Fire Creek Coal & Coke Co. 823
Little Lime................. 337, 348, 351, 352, 358, 361, 363, 366, 368, 370
Little Raleigh "A" Coal..... ..108, 199, **315,** 387, 400, 440, 454
Little Raleigh (Snake Root) Coal .... 88, 89, 108, 168, 172, 176, 182, 201, 205, 217, 313, **315-16,** 352, 370, 387, 396, 397, 400, 413, 415, 416, 421, 424, 428, 429, 434, 440, 444, 447, 452, 454, 455, 679, xxvii, xxxi
Lively, H. S., Core Test (57A) 388B, 404
Lively, Jno., Core Test (57).. ....388B, 404
Lively—1 Mile Northeast Section 89, 420
Localities, Register of.......283-5
Location 1
Location of Coal Mines...... ....878-80, 882, 895-6, 898-903
Location of Sandstone Quarries 910
Lochgelly Mine, Production.. 379
Lochgelly (Stuart Shaft) Mine (143)....724-6, 876, 879, 887, 895
Lock No. 2, Gaging Records..40-42
Locks and Dams in Kanawha River 3
Logan (Monitor) Sandstone.. ....103, 167, **252,** 343
Logan-Mingo Report......... 235, 240, 242, 243, 244, 245, 247, 249, 250, 251, 252, 254, 256, 259, 260, 261, 262, 265, 266, 267, 271, 288, 925, 926, 927, 928
Longacre Mine No. 114 (25).. 507-8, 871, 878, 881, 882, 883, 895
Long Branch Coal Co.:
  Mine (55).................. 190, 191, 192, 552-4, 873, 878, 897, 899
  Mine (89)..........190, 191, 644
  Production 378
  Prospect (340)............. 551
Long Branch No. 2 Mine, Production 378
Longdale Iron Co............ 788
Longdale Iron Co., Sewell Mine (175)................ ....197, 198, 783, 881, 882
Lookout Coal & Coke Co.:
  Lookout Mine (118)........ ....378, 695-6, 881, 885, 895
  Production 378
Loop Creek.................34, 38
Loop Creek Estate Openings (382A, 384, and 385)....... 636
Louisa Railroad............. 10
Loup Creek Branch, C. & O. R. R..................... 12
Loup Creek Branch, C. & O. R. R., Levels.............. 930
Loup Creek Colliery Co...... ....162, 388, 388A, 399, 400
Loup Creek Colliery Co.:
  Beards Fork Mine (51A).. ....537, 872, 878

Page.
Loup Creek Colliery Co.:
  Core Test No. 1 (13)......
    ....388A, 398-9
  Core Test (13A)..388A, 399-400
  Core Test (14)......388A, 400-1
  Core Test No. 2 (35).......
    ....388A, 410-11
  Mine (511)................ 537
  Mine No. 8 (79)...........
    615-8, 630-5, 874, 878, 884, 895
  Opening (389).............. 645
  Opening (418).............. 656
  Opening (449).............. 671
  Page Mine No. 7 Opening
    (51) ....
    538-48, 630, 635, 872, 878, 883, 895
  Production 378, 384
  Prospect (312)............ 531
  Prospects (313, 314, 315, 316, 317, and 318)......... 534
  Prospects (319, 320, 321, and 322) 535
  Prospects (323, 324, 325, 326, and 327)................ 536
  Prospects (328 and 329)... 537
  Prospects (330, 331, 332, and 333) 548
  Prospects (334, 335, and 335A) 549
  Prospect (408)............. 653
Loup Creek No. 2 Mine, Production 378, 384
Low Moor Iron Co., of Va....
  ....388, 388A
Low Moor Iron Co. of Va.:
  Bore Hole No. 1 .....xxiv-xxvi
  Bore Hole No. 2 .....xxvi-xxvii
  Bore Hole No. 3 .....xxvii-xxx
  Bore Hole No. 4 .....xxx-xxxii
  Bore Hole No. 5 xxxii
  Kaymoor Mine No. 1 (130)
    707-8, 875, 879, 881, 882, 886, 895
  Low Moor No. 2 Mine (129)
    706-7, 875, 879, 881, 882, 885-6, 895
  Map Showing Location of Bore Holes................xxv
  Pine-top Entry of No. 2 Mine (471) 707
  Production 378, 384
  Records of Bore Holes.....
    ....xxiv-xxxii
  Water Well (27)...........388A
Low Moor No. 2 Mine (129)
  706-7, 875, 879, 881, 882, 885-6, 895
Low Moor No. 2 Mine (Pine-top Entry) (471) 707
Lower Eckles Coal ....
  (See Fire Creek Coal)
Lower Eagle Mine (115)....
  692-3, 875, 879, 885, 895
Lower Campbell Creek Coal..
  103, 121, 134, 163, 167, 193, 254, **255,** 386, 390, 393, 394, 397, 528, 530
Lower Campbell Creek Sandstone.........103, 121, **254,** 394
Lower Cedar Grove Coal..103, **250**
Lower Cedar Grove Sandstone
  103, 115, 116, 117, 118, 120, 121, 124, 127, 133, 141, 145, 147, 153, 156, 159, 171, 193, **251,** 252, 288, 389, 394
Lower Cedar Grove Sandstone
  ....(See Peerless Sandstone)
Lower Chilton Sandstone.....
  ....102, 141, 158, **245,** 287
Lower Clarion Coal.......... 238
Lower Coalburg Sandstone...
  101, 114, 116, 120, 158, **240,** 287, 362
Lower Dotson Sandstone.....
  106, 149, 159, 165, 167, 172, 173, 187, 188, 189, 193, **274-5,** 278, 344, 427, 432
Lower Douglas Coal.........
  88, 89, 106, 184, 188, 193, 274, 275, **276-8,** 295, 296, 297, 299, 344, 370, 386, 402, 412, 425, 427, 432, 674
Lower Freeport Coal.......99, 237
Lower Freeport "Kidney" Iron Ore 99
Lower Freeport Sandstone...
  ....99, 144, 225
Lower Gilbert Sandstone.....
  105, 138, 139, 149, 155, 157, 159, 164, 167, 189, 194, 267, 268, **269,** 271, 659
Lower Guyandot Sandstone..
  108, 143, 168, 175, 176, 178, 179, **309-10,** 405, 409, 410, 411, 414, 415, 418, 422, 423, 426, 427, 428, 432, 435, 437, 439, 441, 442, 446, 681, 910, xxvi, xxvii, xxviii, xxxi, xxxii
Lower Iaeger Coal...........
  107, 181, 184, 187, 297, **303,** 304, 387, 404, 406, 410, 422, 425, 426, 439, xxvi, xxviii, xxxi, xxxii
Lower Iaeger Sandstone.....
  ....107, **303,** 304
Lower Iaeger Shale...107, **304,** 907
Lower Kittanning (No. 5 Block) Coal...................
  88, 99, 114, 115, 116, 117, 118, 119, 124, 135, 144, 146, 147, 152, 158, 166, 170, 226, 227, **228-9,** 232, 234, 375, 386, 456, 458, 460, **461-9, 867, 871**
Lower Kittanning Limestone. 238
Lower Kittanning Sandstone. 238
Lower Mercer Coal..........
  ....(See Stockton Coal)
Lower Mercer Limestone.233, 235
Lower Monitor Sandstone.103, **252**

Page.
Lower Nuttall Sandstone..... 88, 89, 107, 129, 130, 137, 138, 140, 142, 159, 165, 167, 172, 174, 175, 177, 178, 179, 180, 181, 184, 187, 192, 195, 274, 278, 295, **297-9**, 300, 301, 302, 303, 304, 305, 345, 347, 350, 352, 353, 354, 362, 365, 366, 367, 369, 370, 371, 396, 397, 398, 399, 400, 402, 404, 405, 406, 407, 408, 409, 410, 411, 412, 417, 419, 420, 421, 422, 425, 426, 427, 428, 429, 432, 435, 436, 438, 439, 441, 680, 906, 910, 911, 913, xxiv, xxvi, xxviii, xxxi, xxxii
Lower Pocahontas Sandstone 110, 211, **329**
Lower Pottsville............. 323
Lower Raleigh Sandstone.... 89, 109, 134, 168, 176, 179, 182, 198, 199, 204, 205, 209, 218, 239, 314, 315, **317**, 352, 353, 354, 365, 366, 367, 369, 396, 400, 410, 412, 413, 418, 419, 421, 424, 428, 431, 434, 444, 446, 447, 448, 452, 453, 454, 455, 910, 913, xxviii
Lower Thacker Coal......... ..(See Lower Cedar Grove Coal)
Lower War Eagle Coal...... 88, 105, 142, 149, 157, 167, 183, 193, 194, **266-7**, 274, 386
Lower War Eagle Sandstone. 105, 138, 139, 141, 143, 155, 157, 159, 182, 183, 185, 186, 188, 191, **266**, 268, 655
Lower Winifrede Coal....... 101, 114, 117, 118, 120, 166, **242**, 386
Lower Winifrede Sandstone.. 101, 120, 133, 137, 147, 158, 190, **242**, 366
Lumber Industry............922-3
Lykens, Jas................. 24
Lyman Mine (149)........... 729
Lynch Nos. 1, 2, and 3 Mines, Production 379
Lynchburg Colliery Co.:
  Mine (15)................. 479
  Mine (30)...129, 513-14, 872, 878
  Mine (31)................. 514
  Mine (57)................. 579
  Production 378
Lynchburg Mine, Production.. 378

M

Macdonald Colliery Co., Production 378
Macdonald Mine (168)....... 311, 378, 771-6, 876, 879, 881, 882, 891, 895, 897, 899.
Macdonald Section........... 89
MacNickell Opening (441)... 668
Mahoney, J. W................ 661
Mahoney, M. P., Opening (425) 661
Main Line, C. & O. R. R...... 9
Main Line, C. & O. R. R., Levels 929-30
Main Line, K. & M. R. R...... 13
Main Line, K. & M., R. R., Levels 933
Main Line, Virginian Ry., Levels 933
Malone, Ed................. 738
Maloney, M. P., Opening..... 189
Mann Mountain Anticline.... ....91-2, 342, 349, 358, 359
Manns Creek...............35, 38
Manns Creek, Mouth of, Section 196-7, 222
Manns Creek Railroad....... 14
Manns Creek Railroad, Levels 934-5
Maps Showing Minable Area of Coals:
  Alma 494
  Campbell Creek (Peerless and No. 2 Gas).......... 499
  Cedar Grove............... 489
  Chilton 486
  Coalburg 475
  Douglas 673
  Eagle 615
  Fire Creek................ 797
  Gilbert 664
  Glenalum Tunnel.......... 660
  Little Eagle.............. 648
  Lower Kittanning (No. 5 Block) 462
  Middle Kittanning (North Coalburg) 457
  No. 2 Gas................. 499
  No. 3 Pocahontas.......... 862
  No. 5 Block (Lower Kittanning 462
  No. 6 Pocahontas.......... 861
  North Coalburg (Middle Kittanning) 457
  Peerless 499
  Powellton 580
  Sewell 678
  Stockton 472
  Winifrede 482
Marble, Black............... 263
Marine Fossil Horizons, Kanawha Group.......... 279-280
Marr Branch................. 38
Marrs Branch Coal Co., Cataract Mine (128)...705-6, 875, 879
Marshall, A. F.............. 782
Marsh Fork Limestone....... 148
Marshall-Wetzel-Tyler Report 86
Martin, F. H................ 609
Martin, Jas................. 740
Martin, Morris, Opening (481) 781
Martin, Mrs. E. T., Coal Test (26).......176-7, 388A, 403, 404
Marting,—¼ Mile Southeast Section...........88, 122-4, 222
Marting, P. H.............. 607
Mason, O. W.............139, 622
Mason, O. W., Opening (431) 665
Massey, R. H............... 682
Material, Road............. 908-9
Material, Road, etc. (Chapter XII) 904-924
Matewan Coal................ 104, 148, 151, 154, 157, 161, 163, 167, 171, 194, 257, 258, **259**, 391, 392, 393, 394.
Matewan Sandstone.............. ....104, 194, 258, **259**, 386

Page.
Mathers & Morgan 66, 75, 83
Matthews & Morton Mine (100) 187, 675, 875, 879
Mauch Chunk Red Shale ... 111, 112, 123, 144, 180, 186, 187, 188, 193, 196, 197, 198, 210, 211, 212, 213, 214, 216, 218, 219, 220, 278, 322, 332-5, 347, 348, 387, 450, 465, 906, 907, xxx.
Mauch Chunk Series 97
Mauch Chunk Series:
  Chapter IX 332-5
  General Section 111
  Oil and Gas Sands 337
  Thickness 221-3
Maximum River Stages, Charleston 6
Maxton Sand .... 146, 169, 181, 317, 338-9, 341, 344, 346, 347, 348, 351, 352, 356, 359, 361, 362, 365, 366, 367, 368, 369, 370.
Maywood—Aldrich Corner Section 262-4, 222
M. B. Coal & Coke Co.:
  Columbia Mine (10) 151, 152, 469
  Columbia Mine (54) 151, 152, 517-8, 872, 878
  Kimberly Mine (49) ... 151, 526-7, 528, 538, 872, 878
  Production 878
M. B. Coal Co., Elk Ridge No. 1 Mine (44) .... 151, 155, 461-2, 872, 878, 897, 898.
M. B. Coal Co., Elk Ridge No. 2 Mine (47) 461, 462-3, 872, 878, 897, 898
M. B. Coal Co., Opening (350) 603
Mead, E. A. 745
Meadow Bridge — 1.5 Miles Northwest Section 89
Meadow Creek 36, 39
Meadow Creek—1.5 Miles North Section 86
Meadow Creek Quadrangle Levels 941-3
Meadow Creek Station Section 214-15, 222
Meadow Coal 35-36
Meadow Fork Coal Co., Meadow Fork Mine (117) 676, 730-1, 876, 879
Meadow River 24, 27, 39
Meadow River:
  At Russellville Discharge Measurements 76, 77, 78, 80, 82, 83
  At Russellville Gauging Records 75-83
  Indicated Horse-Power Developed by 418
  Selected Reservoir Site 424
Meadow River Lumber Co. 872
Meadow River Lumber Co.:
  Hanna & Wright, Opening (498) 787
  Opening (137) 787, 877, 879
  Opening ([illegible]) .... [illegible]
  Prospect ([illegible]) .... [illegible]
Meadow River Smokeless Coal 872
Meadow River Smokeless Coal Co. (J. W. Dwyer) Mine (122) 202, 327, 850, 852, 877, 880
Meadows, H. 730
Meadows, John, Opening (520) 793
Measurements, Discharge:
  Gauley River at Belva 68, 69, 70, 71, 72, 73, 74, 75
  Kanawha River at Montgomery 41
  Kanawha River at Montgomery (Leakage) 42
  Meadow River at Russellville 76, 77, 78, 80, 82, 83
  New River at Fayette .... 44, 47, 48, 49, 50, 52, 53, 55, 58, 61, 62, 63, 66.
Mecca Colliery Co. 522, 524, 525
Mecca Colliery Co. Mine (5) 147, 148, 465, 871, 878
Mecca Mine (38) 521-2, 524, 872, 878
Members, Description of:
  Allegheny Series 224-9
  Kanawha Group 231-278
  Mauch Chunk Series 333-5
  New River Group 295-322
  Pocahontas Group 324-331
Mercer? Coal, Lower .... (See Stockton Coal)
Mercer? Coal, Upper .... (See Stockton "A" Coal)
Mercer Limestone, Lower. 233, 235
Mercer Limestone, Lower .... (See Kanawha Black Flint)
Method Used in Representing Structure 86-90
Michigan Coal Co. 686
Michigan Coal Co., Production 878
Michigan Mine, Production.. 878
Michigan Mine (106)..686, 875, 879
Middleburg, Chas., Opening (484) 784
Middleburg, Chas., Openings (485 and 486) 785
Middle Cedar Grove Sandstone 243, **250**, 288
Middle Jaeger Sandstone 107, 187, **303**, 422, 425
Middle Kittanning Coal .... 88, 99, 114, 115, 116, 117, 118, 119, 124, 136, 144, 146, 225, **226-7**, 228, 475, 481, 455, **456-61**, 463, 464, 465, **867**.
Middle Pottsville 234
Middle War Eagle Coal .... (See Eagle Coal)
Midvale Colliery Co.:
  Mine (11) 150, 178-9, 871, 878
  Mine (32) 513-15, 872, 878
  Production 878
Midvale Mine, Production 878
Milburn By-Products Coal Co. 639
Milburn Coal & Coke Co. 640
Milburn Coal Co. 165
Milburn Coal Co.:
  Mine No. 2 (64) 165, 640, 871, 878, 897, 898
  Mine (87) 165, 639, 640, 871, 878, 897, 898, 899
  Opening (438) 550-1
  Production 878
  Prospect (67A) 609

Page.
Milburn Coal Co.:
  Prospect (88A)............ 642
  Prospect (88B)............ 643
  Prospect (337)............ 550
Milburn No. 1 Mine, Production 378
Mileage, Road..............15-16
Mill Creek Branch, C. & O. R. R. 11-12
Mill Creek Branch, C. & O. R. R., Levels................ 932
Mill Creek Colliery Co. Mine (102)............682-4, 884, 895
Mill Creek Colliery Co., Production 378
Mill Creek Mine, Production.. 378
Mill Creek of Meadow River.. 39
Mill Creek of New River...35, 39
Miller, Geo. E.............. 351, 353, 365, 366, 367, 368, 369, 370.
Miller Local Mine Opening (482) 781
Miller Section.........89, 175, 222
Minable Coal Beds........... 385
Minable Coal by Magisterial Districts 868
Minable Coal by Magisterial Districts:

Alma Coal.

  Falls .... 88, 103, 117, 118, **251-2,** 253, 386, 394, 470, 492, **493,** 494, 498, 501 507, **867.**
  Fayetteville .... 88, 103, 191, 192, 193, **251-2,** 253, 386, 470, 492, 494, **496-7,** 498, **867.**
  Kanawha .... 88, 103, 144, 145, 147, 152, 167, **251-2,** 253, 386, 470, 490, 492, **493-6,** 494, 498, 524, 525, **867.**
  Mountain Cove............. 88, 103, **251-2,** 253, 386, 470, 492 494, **496,** 498, **867**

Cedar Grove Coal.

  Falls .... 102, 114, 115, 117, 118, 120, 139, 246, 247, 248, **249-50,** 251, 386, 390, 470, **488,** 489, 492, **867.**
  Fayetteville 102, 191, 246, 247, 248, **249-50,** 251, 386, 470, 488, 489, **491,** 492, **867**
  Kanawha .... 102, 147, 153, 156, 246, 247, 248, **249-50,** 251, 386, 470, 485, 488, **488-90,** 492, 493, **867.**
  Mountain Cove............ 102, 171, 173, 246, 247, 248, **249-50,** 251, 386, 470, 488, 489, **491,** 492, **867.**

Chilton Coal.

  Falls .... 88, 102, 114, 117, 118, 120, 126, 132, 242, 243, **244-5,** 246, 375, 386, 389, 470, **484,** 486, 487, 488, **867.**

Page.
Minable Coal by Magisterial Districts:

Chilton Coal.

  Fayetteville 88, 102, 190, 242, 243, **244-5,** 246, 375, 386, 470, 484, **485-7,** 487, 488, **867**
  Kanawha .... 88, 102, 145, 156, 242, 243, **244-5,** 246, 362, 375, 386, 470, 484, **485,** 486, 487, 488, **867.**
  Mountain Cove............ 88, 102, 171, 242, 243, **244-5,** 246, 375, 386, 470, **484,** 486, 487, 488, **867.**

Coalburg Coal.

  Falls .... 88, 101, 114, 116, 120, 125, 126, 130, 131, 132, 136, 137, 141, 234, 235, **236-9,** 240, 241, 250, 375, 386, 470, **474-9,** 480, 481, **867, 871.**
  Fayetteville .... 88, 101, 190, 234, 235, **236-9,** 240, 241, 250, 375, 386, 470, 475, **479-80,** 480, 481, **871.**
  Kanawha .... 88, 101, 158, 162, 166, 234, 235, **236-9,** 240, 241, 250, 362, 375, 386, 470, 475, **479-80,** 480, 481, **867, 871.**
  Mountain Cove............ 88, 101, 170, 234, 235, **236-9,** 240, 241, 250, 375, 386, 470, 475, **479-80,** 480, 481, **867, 871.**

Douglas Coal.

  Falls 88, 89, 106, 142, 267, **273-4,** 276, 375, 386, 470, 666, 673, 674, **875**
  Fayetteville 88, 89, 106, 183, 186, 193, 195, 267, **273-4,** 276, 375, 386, 470, 673, 675-6, **867, 875**
  Kanawha .... 88, 89, 106, 149, 164, 166, 167, 267, **273-4,** 276, 375, 386, 398, 470, 673, 675, 676, **867, 875.**
  Mountain Cove............ 88, 89, 106, 172, 173, 267, **273-4,** 276, 375, 386, 402, 470, 673, 674, **875.**

Eagle Coal.

  Falls .... 88, 89, 104, 119, 121, 122, 123, 124, 127, 128, 131, 134, 136, 138, 139, 141, 237, 257, 258, 259, **260-1,** 262, 263, 266, 375, 386, 388A, 391, 392, 393, 394, 395, 470, 507, 511, **614-22,** 647, **867, 873-4.**
  Fayetteville .... 88, 89, 104, 185, 186, 188, 190, 191, 194, 237, 257, 258, 259, **260-1,** 262, 263, 266, 343, 375, 386, 470, 615, **643-7,** 656, 657, **867, 873-4.**
  Kanawha 88, 89, 104, 145, 148, 149, 150, 151, 154, 155, 159, 161, 162, 163, 164, 165, 167, 237, 258, 259, **260-1,** 262, 263, 264, 266, 351, 354, 367, 368, 371, 375, 386,

Page.
Minable Coal by Magisterial Districts.

Eagle Coal.

Kanawha ....
[illegible] 622-43, [illegible] 867, 873-4.
Mountain Cove ....
[illegible] 260-1, [illegible] 622, [illegible] 867, 873-4.

Fire Creek Coal.

Falls .... [illegible]
Fayetteville ....
[illegible] 319-20, [illegible] 798-815, 849, 877, 892-4, 897, [illegible] xxvii, xxix, xxx.
Kanawha ....
[illegible] 319-20, [illegible] 877, 892-4, [illegible] 913
Mountain Cove ....
[illegible] 892-4, [illegible]
Nuttall ....
[illegible] 319-20, [illegible] 877, 892-4, 897, [illegible]
Quinnimont ....
[illegible] 319-20, [illegible] 452, 453, 454, 455, 676, 797, 821-849, [illegible] 867, 877, 892-4, 897, [illegible]
Sewell Mountain ....
[illegible] 319-20, [illegible] 815-820, 849, 867, 877, 892-4, 897, [illegible]

Gilbert Coal.

Falls ....
[illegible] 271, [illegible] 663-6, 672, 674, 867, 875.
Fayetteville ....
[illegible] 271 [illegible] 670-1, 672, 867, 875.
Kanawha ....
[illegible] 271, [illegible] 669-70, [illegible] 875.
Mountain Cove ....
[illegible] 271, [illegible] 666-9, 867, 875.

Glenalum Tunnel Coal.

[illegible]
[illegible] 268-9, [illegible] 659-662, [illegible] 874-5.

Glenalum Tunnel Coal

Kanawha ....
[illegible] 167, [illegible] 268-9, [illegible] 470, 658-9, 660, 662, 867, 874-5.
Mountain Cove ....
[illegible] 171, [illegible] 268-9, [illegible] 874-5.

Little Eagle Coal.

Falls ....
[illegible] 139, 143, 261, 262-3, 375, 386, [illegible] 649-51, 658, 867, 874.
Fayetteville ....
[illegible] 262-3, [illegible] 470, [illegible] 654-7, [illegible] 867, 874.
Kanawha ....
[illegible] 150, 151, 152, 154, 155, 157, [illegible] 262-3, [illegible] 652-4, 658, 867, 874.
Mountain Cove ....
[illegible] 262-3, [illegible] 651-2, [illegible] 867, 874.

Middle Kittanning (North Coalburg) Coal.

Falls ....
[illegible] 226-7, [illegible] 458-60, [illegible] 867.
Kanawha ....
[illegible] 226-7, [illegible] 456-8, 461, 867.

No. 2 Gas Coal.

Falls ....
[illegible] 115, 119, [illegible] 131, 132, 133, 139, 141, [illegible] 253-4, [illegible] 498-500, 500-21, [illegible] 867, 871-3, 883.
Fayetteville ....
[illegible] 253-4, [illegible] 498-500, 551-6, [illegible] 867, 871-3, 883.
Kanawha ....
[illegible] 253-4, [illegible] 386, [illegible] 498-500, 521-51, [illegible] 867, 871-3, 883.

Page.
Minable Coal by Magisterial Districts:

No. 2 Gas Coal.

Mountain Cove............ 88, 89, 92, 103, 171, 173, 237, 246, 249, 250, 251, **253-4,** 255, 256, 257, 258, 259, 260, 263, 273, 375, 386, 402, 470, **498-500, 556-78,** 613, **867, 871-3, 883.**
Quinnimont .... 88, 89, 90, 103, 237, 246, 249, 250, 251, **253-4,** 255, 256, 257, 259, 260, 263, 375, 386, 470, **498-500,** 613, **871-3, 883.**

No. 3 Pocahontas Coal.

Fayetteville .... 89, 110, 182, 323, 324, 325, 327, 328, **329,** 330, 335, 387, 388B, 430, **862, 877.**
Nuttall .... 89, 110, 177, 323, 324, 325, 327, 328, **329,** 330, 335, 387, **862, 877.**
Quinnimont .... 89, 110, 210, 211, 216, 218, 219, 323, 324, 325, 327, 328, **329,** 330, 334, 335, 387, 388C, **862, 864-6, 867, 877.**
Sewell Mountain.......... 89, 110, 197, 198, 199, 205, 323, 324, 325, 327, 328, **329,** 330, 335, 387, 388C, **862, 863, 866, 867, 877.**

No. 5 Block (Lower Kittanning) Coal.

Falls .... 88, 99, 114, 115, 116, 117, 118, 119, 124, 135, 226, **228-9,** 232, 234, 375, 386, 456, 460, **461-3,** 469, **867, 871.**
Kanawha .... 88, 99, 144, 146, 147, 152, 158, 166, 226, 227, **228-9,** 232, 234, 375, 386, 456, 458, 462, **463-9,** 469, **867, 871.**
Mountain Cove............ 88, 99, 170, 226, **228-9,** 232, 234, 375, 386, 456, 462, **463,** 469, **867, 871.**

No. 6 Pocahontas Coal.

Fayetteville .... 88, 89, 110, 323, 324, 325, 326, **327,** 328, 329, 375, 387, 388B, 430, 432, 435, **851, 877.**
Nuttall .... 88, 89, 110, 177, 323, 324, 325, 326, **327,** 328, 329, 375, 387, **851, 877.**
Quinnimont .... 88, 89, 110, 208, 210, 213, 214, 215, 217, 218, 219, 220, 321, 323, 324, 325, 326, **327,** 328, 329, 375, 387, 388C, 450, 451, 454, 851, **853-860, 867, 877.**
Sewell Mountain.......... 88, 89, 110, 197, 198, 199, 202, 203, 204, 205, 323, 324, 325, 326, **327,** 328, 329, 375, 387, 388B, 388C, **850-3, 860, 867, 877**

Page.
Minable Coal by Magisterial Districts:

Peerless Coal.

Falls .... 88, 103, 115, 119, 120, 123, 127, 132, 139, 141, 251, **253-4,** 375, 386, 389, 391, 394, 470, **498-500, 500-21,** 578, **867, 871-3, 883.**
Fayetteville .... 88, 103, 191, 193, 251, **253-4,** 375, 386, 470, **498-500, 551-6,** 578, **867, 871-3, 883.**
Kanawha .... 88, 103, 145, 147, 151, 152, 153, 156, 161, 163, 167, 251, **253-4,** 375, 386, 397, 470, 495, **498-500, 521-51,** 578, **867, 871-3, 883.**
Mountain Cove................. 88, 103, 251, **253-4,** 375, 386, 470, **498-500, 556-78, 867, 871-3, 883.**

Powellton Coal.

Falls .... 88, 104, 121, 125, 127, 129, 131, 132, 139, 255, **256,** 257, 259, 375, 386, 389, 390, 391, 392, 393, 394, 395, 470, **579-81,** 613, **867, 873, 883.**
Fayetteville .... 88, 104, 191, 194, 255, **256,** 257, 259, 375, 386, 470, 580, **610-12,** 613, **867, 873, 883.**
Kanawha 88, 104, 148, 150, 151, 154, 155, 156, 161, 163, 164, 165, 167, 255, 256, 257, 259, 264, 362, 368, 375, 386, 397, 470, 529, 532, 580, **581-610,** 613, **867, 873, 883**
Mountain Cove............ 88, 104, 171, 173, 255, **256,** 257, 259, 375, 386, 470, 580, **610,** 613, **867, 873, 883.**

Sewell Coal.

Falls .... 88, 89, 92, 93, 108, 128, 137, 138, 142, 143, 276, 279, 294, 298, 304, 305, 307, 308, 309, **310-11,** 312, 314, 316, 317, 319, 335, 375, 387, **677-81, 795, 867, 875-7, 884-92, 897.**
Fayetteville .... 88, 89, 108, 180, 181, 184, 187, 190, 192, 195, 276, 278, 279, 294, 305, 307, 308, 309, **310-11,** 312, 314, 317, 319, 335, 373, 375, 387, 388A, 388B, 405, 406, 407, 408, 410, 411, 412, 413, 414, 416, 417, 418, 419, 420, 422, 423, 424, 425, 426, 427, 428, 429, 432, 433, 435, 436, 437, 438, 439, 440, 441, 442, 656, 678, **704-782, 795, 867, 875-7, 884-92, 897,** xxiv, xxvi, xxvii, xxviii, xxx, xxxi, xxxii.
Kanawha. .... 88, 89, 108, 168, 276, 279, 294, 305, 307, 308, 309, **310-11,** 312, 314, 317, 319, 335, 352, 369, 370, 375, 387, 388A, 396, 397, 399, 401, 678, **681-2, 875-7, 884-92, 897.**

Page.
Minable Coal by Magisterial Districts:

Sewell Coal.

Mountain Cove ....
88, 89, 92, 108, 172, 273, 276, 279, 294, 305, 307, 308, 309, **310-11**, 312, 314, 317, 319, 335, 375, 387, 388A, 402, 403, 678, **682-7**, **795**, **867**, **875-7**, **884-92**, **897**.
Nuttall ....
88, 89, 92, 94, 108, 175, 176, 177, 178, 179, 276, 279, 294, 305, 307, 308, 309, **310-11**, 312, 314, 316, 317, 319, 335, 358, 375, 387, 678, 679, **687-704**, '**795**, **867**, **875-7**, **884-92**, **897**.
Quinnimont ....
88, 89, 90, 92, 94, 95, 108, 215, 276, 279, 294, 305, 307, 308, 309, **310-11**, 312, 314, 317, 319, 321, 334, 335, 356, 357, 358, 375, 387, 388C, 678, **794**, **795**, **867**, **875-7**, **884-92**, **897**
Sewell Mountain ....
88, 89, 92, 93, 94, 108, 196, 197, 198, 199, 200, 201, 202, 203, 204, 276, 279, 294, 305, 307, 308, 309 **310-11**, 312, 313, 314, 316, 317, 319, 331, 335, 358, 359, 375, 387, 388B, 388C, 443, 444, 445, 446, 447, 448, 678, **783-94**, **795**, **867**, **875-7**, **884-92**, **897**

Stockton Coal.

Falls ....
88, 101, 116, 120, 124, 126, 131, 136, 232, **234-5**, 236, 386, 470, **471**, 472, 474, **867**.
Fayetteville ....
88, 101, 190, 232, **234-5**, 236, 386, 470, 472, **473**, 474, **867**.
Kanawha ....
88, 101, 143, 147, 158, 162, 166, 232, **234-5**, 236, 362, 386, 470, 472, **473**, 474, **867**.
Mountain Cove ....
88, 101, 170, 232, **234-5**, 236, 386, 470, **471-3**, 474, **867**.

Winifrede Coal.

Falls ....
88, 101, 113, 114, 115, 116, 118, 120, 124, 126, 132, 133, **241**, 242, 243, 244, 246, 249, 250, 386, 394, 470, 480-1, **481**, 482, 483, 484, 488, **867**.
Fayetteville ....
88, 101, 190, 240, **241**, 242, 243, 244, 246, 249, 250, 386, 470, 480-1, 482, **483**, 484, 488, **867**.
Kanawha ....
88, 101, 158, 162, 166, 240, **241**, 242, 243, 244, 246, 249, 250, 362, 366, 386, 470, 480-1, 482, **483**, 484, 486, 488, **867**.
Mountain Cove ....
88, 101, 171, 240, **241**, 242, 243, 244, 246, 249, 250, 386, 470, 480-1, **481**, 482, 483, 484, 488, **867**.

Page.
Minable Coals:
Allegheny Series........455-469
Kanawha Group........470-676
New River Group........676-849
Pocahontas Group........849-866
Minden Mines..........722-4, 887
Minden No. 2 Mine (142)....
721-4, 876, 879, 881, 882, 887, 895, 897, 899.
Minden No. 3 Mine (141)....
....719, 720-1, 887, 895, 897, 899
Minden No. 4 Mine (140).....
....719-20, 721, 887, 895, 897, 899
Minden No. 5 Mine (139)....
..378, 718-19, 887, 895, 897, 899
Mineral Products............ 20
Mineral Resources (Part III)
........................336-924
Mines by Coal Beds.......... 375
Mines by Nos.:
1.....................227, 458
2.....................124, 461
3................464, 871, 878
4................464, 871, 878
5.......145, 146, 465, 871, 878
6...............466-7, 871, 878
7................145, 146, 467
8...................146, 467-8
9................468, 871, 878
10...............151, 152, 469
11..............476-7, 871, 878
12.....131, 132, 477-8, 871, 878
13...................132, 478
14.........136, 478-9, 871, 878
15......................... 479
16....................156, 485
16A...................161, 529
17.......501, 871, 878, 881, 882
18......................... 502
19......502-3, 871, 878, 881, 882
20..............503-4, 871, 878
21 and 22.................. 504
23 ....
504-6, 871, 878, 881, 882, 883, 895.
24............507, 616, 871, 878
25 ....
507-8, 871, 878, 881, 882, 883, 895.
25A........................
509, 871, 878, 881, 882, 897, 899.
26......................... 509
27.................510, 871, 878
28.....................510-11
28A................511, 871, 878
28B....................127, 512
29.................512, 871, 878
30........129, 513-14, 872, 878
31......................... 514
32..............514-15, 872, 878
33....131, 132, 515-16, 872, 878
34.................516, 872, 878
35.................517, 872, 878
36....273, 518, 872, 878, 883, 895
37......................... 520
38..........521-2, 524, 872, 878
39.................522, 872, 878
40 and 41.................. 523
42............145, 523, 872, 878
43.................524, 872, 878
44...............524-5, 872, 878
45.......145, 525-6, 528, 872, 878
46.....529-30, 872, 878, 881, 882
47.................530, 872, 878

Page.

Mines by Nos.:
48..............532-3, 872, 878
49.151, 526-7, 528, 538, 872, 878
50.....151, 152, 527-8, 872, 878
51 .... 538-48, 630, 635, 872, 878, 883, 895
51A..............537, 872, 878
51B........................ 537
52........................ 556-574, 873, 878, 881, 882, 883, 895.
53........................ 574
54...............575, 873, 878
55........................ 190, 191, 192, 552-4, 873, 878, 897, 899.
56.....192, 193, 554-6, 873, 878
57........................ 579
58........................ 264, 581-600, 873, 878, 881, 882, 883, 895.
59....................529, 601
60..154, 155, 601-2, 873, 878, 898
61..601, 602-3, 873, 878, 897, 898
61A.............605-6, 873, 878
62........................ 604
62A..............605, 873, 878
63..165, 606, 873, 878, 897, 898
64...........164, 607, 873, 878
65................608, 873, 878
66........................ 608
67................609, 873, 878
67A........................ 609
68...........616, 897, 900, 901
69........507, 616, 897, 900, 901
70........................ 616
71......................124, 617
72........................ 617
73...617-18, 873, 878, 884, 895
74..............623-4, 874, 878
75..145, 624-5, 874, 878, 881, 882
76.....625-6, 874, 878, 881, 882
77........................ 626-7, 874, 878, 881, 882, 897, 898.
78........................ 627
79........................ 545-8, 630-5, 874, 878, 884, 895.
80..............636-7, 874, 878
81..............637-8, 874, 879
81A.............638-9, 874, 879
82........................ 165, 629, 639, 874, 879, 897, 898, 899.
83..161, 164, 629, 640, 874, 879
84. ....629, 640-1, 874, 879
85 and 86.............629, 641
87....................629, 642
88...........629, 642, 874, 879
88A........................ 642
88B........................ 643
89...............190, 191, 644
90..194, 644-5, 874, 879, 884, 895
91........122, 649, 651, 874, 879
92..............651, 873, 879
93........................ 183, 185, 186, 188, 262, 647, 656-7, 874, 879, 884, 895.
94.......190, 191, 659, 874, 879
95...........194, 661, 874, 879
96..............668, 875, 879
97..............669, 875, 879
98........................ 195, 267, 274, 672, 675-6, 875, 879.

Page.

Mines by Nos.:
99................301, 875, 879
100............137, 679, 875, 879
101................681, 875, 879
102.........172, 682-4, 884, 895
103................684, 875, 879
104..............684-5, 884, 895
105..............685-6, 875, 879
106................686, 875, 879
107......686-7, 875, 879, 884, 895
108........................ 687
109...........179, 688, 875, 879
110....689-90, 875, 879, 884, 895
111.....690-1, 881, 882, 884-5, 895
112....................196, 691
113....................196, 691
114........................ 692
115......692-3, 875, 879, 885, 895
115A.............693-4, 875, 879
116........................ 694
117.....694-5, 875, 879, 885, 895
118..............695-6, 885, 895
119........................ 696-7, 875, 879, 885, 895, 897, 898.
120........................ 181, 697-700, 875, 879, 885, 895
121.....................700, 784
122.....700-1, 875, 879, 885, 895
123 and 124............... 701
125..............702-3, 875, 879
126..............703-4, 875, 879
127................705, 875, 879
128..............705-6, 875, 879
129........................ 706-7, 875, 879, 881, 882, 885-6, 895.
130........................ 707-8, 875, 879, 881, 882, 886, 895.
131....709-10, 875, 879, 886, 895
132........................ 711-12, 875, 879, 881, 882, 886, 895.
133.....712-13, 876, 879, 886, 985
134...............714, 876, 879
135........................ 714-17, 876, 879, 881, 882, 886-7, 895.
136........................ 717
137................717, 876, 879
138........................ 718
139....718-19, 887, 895, 897, 899
140........................ 719-20, 721, 887, 895, 897, 899
141........................ 719, 720-1, 887, 895, 897, 899,
142 .... 721-4, 876, 879, 881, 882, 887, 895, 897, 899.
143.....724-6, 876, 879, 887, 895
144........................ 413, 726-7, 876, 879, 887-8, 895
145.....728-9, 876, 879, 888, 895
146........................ 729

Page.
Mines by Nos.:
147.........378, 730-1, 876, 879
148........................ 731
149 and 150............... 729
151........................
731-2, 876, 879, 888, 895, 897, 898, 900.
152........................
733-4, 876, 879, 881, 882, 888, 895.
153........................
734-7, 876, 879, 888, 895, 897, 900.
154..............737-8, 888, 895
155........................
309, 738-9, 876, 879, 881, 882, 888, 895, 897, 899.
155A......................
378, 740-1, 876, 879, 889, 895
156.....741-2, 876, 879, 889, 895
157..............742-3, 889, 895
158.189, 190, 743-4, 745, 889, 895
159.744, 745-6, 876, 879, 889, 895
160.379, 746-7, 889, 895, 897, 898
161........................
747-63, 764, 876, 879, 881, 882, 889-90, 895, 897, 898
162..............747, 750, 763-4
163.....764-7, 876, 879, 890, 895
164 ....767, 876, 879, 897, 898
165............767-9, 890-1, 895
166........................ 770
167........................
310, 770-1, 876, 879, 881, 882, 891, 895.
168........................
311, 378, 771-6, 780, 876, 879, 881, 882, 891, 895, 897, 899.
169.....776-7, 876, 879, 891, 895
170........................ 777
171...................... 777-8
172.....778-9, 876, 879, 891, 895
173...779-80, 876, 879, 891-2, 895
174........................
192, 195, 298, 423, 782-3, 876, 879.
175.......197, 198, 783, 881, 882
176................198, 199, 783
177, 178 and 179........... 784
180...................... 787-8
181.................788, 876, 879
182 and 183................ 788
184.................786, 877, 879
185.................787, 877, 879
186.................791, 877, 879
187.........717, 798-9, 892, 895
188.........798, 799-810, 892, 895
189.................810, 877, 879
190........................ 811
191....811-12, 877, 879, 892, 895
192....812-13, 877, 879, 892, 895
193.................813, 877, 880
194...319, 816, 877, 880, 881, 882
195........................ 818
196........................
198, 199, 817, 877, 880, 892, 895.

Page.
Mines by Nos.:
197.................818, 877, 880
198........................
821-2, 877, 880, 881, 882, 892, 895.
199............823-4, 892-3, 895
200........................
824-5, 877, 880, 881, 882, 893, 895
201.....825-6, 877, 880, 893, 895
202.................205, 206, 826
203.....826-8, 877, 880, 893, 895
204.................828, 877, 880
205....206, 207, 814-15, 893, 895
206........................ 828
207............208, 829, 877, 880
208.....212, 319, 831-2, 881, 882
209......832-3, 877, 880, 893, 895
210.....833-4, 877, 880, 893, 895
211......212, 213, 834-5, 893, 896
212........................ 835
213.....836, 877, 880, 893-4, 896
214......837, 877, 880, 881, 882
215..............837-9, 894, 896
216........................ 839
217.............839-44, 894, 896
218.....844-5, 894, 896, 897, 899
219......845-6, 894, 896, 897, 899
220.....846-7, 894, 896, 897, 899
221.......217, 218, 320, 877, 880
222...202, 327, 850, 852, 877, 880
223...........858, 859, 877, 880
224......214, 859, 860, 877, 880
225...........861, 865, 877, 880
226........................ 225
227 and 228................ 233
229, 230, 231, and 232...... 277
233, 234, 235, and 236....... 278
237........................ 300
238, 239, and 240........... 301
241, 242, and 243........... 302
244........................ 303
245 and 246................ 306
247....................202, 306
248, 249, and 250.......... 308
251....................202, 309
252, 253, and 254.......... 312
255, 256, 257, and 258...... 313
259....................316 679
260.....................172, 316
261, 262, and 263........... 316
264...................... 320-1
266............136, 158, 463, 465
267, 268, and 269...159, 463, 465
270................460, 463, 465
271........................ 460
272........................ 463
273....................120, 471
274........................ 471
275....................170, 473
276........................ 473
277 and 278................ 476
279....................190, 487
280....................139, 488
281, 282, and 283........... 490
284....................191, 491
285........................ 493

Page.
Mines by Nos.:
286....490, 493-5
287....495
288 and 289....495, 496
290 and 291....496
292....497
293....193, 497
294....512
295, 296, and 297....513
298, 299, and 300....519
301, 302, and 303....520
303A....520-1
303B....521
304....154, 528
305....159, 528-9
306 and 307....531
308....496, 531
309....531
310....532
311....150, 533
312....533
313, 314, 315, 316, 317, and 318....534
319, 320, 321, and 322....535
323, 324, 325, 326, and 327....536
328 and 329....537
330, 331, 332, and 333....548
334, 335, and 335A....549
336....549, 872, 873, 878
336A....550, 873, 878
337....550
338....165, 550
339 and 340....551
341....575
341A, 342, 343, and 344....576
345 and 346....577
347....578
348....577
348A....579
349....581
350....603
351....604
352....163, 604
353 and 354....610
355, 356, and 357....611
358....191, 611
359....194, 612
360....612
361....618
362, 363, 364, and 365....619
366 and 367....620
368....620, 873, 874, 878
369, 370, 371, 372, and 373....621
374....622
374A....173
375....623
376....627
377....155, 628
378....628
379....628, 654
380....629, 647, 653
381....629
382....635
382A, 383, 384, and 385....636
386 and 387....643
388....644
389....645

Page.
Mines by Nos.:
390 and 391....646
392....646, 657
393....646
394....185, 647
395 and 396....649
397, 398, 399, 400, 401, and 401A....650
402 and 403....651
404, 405, and 406....652
407, 408, 409, 410, and 411....653
412....182, 183, 654
413....185, 654
414, 415, 416, and 417....655
418....656
419, 420, and 421....657
422 and 423....659
424, 425, and 426....661
427, 428, 429, and 430....663
431....140, 665
432, 433, 434, and 435....665
436....666, 674
437....666
438, 439, 440 and 440A....667
441, 442, and 443....668
444....669
445, 446, and 447....670
448....163, 670
449, 450, and 451....671
452....674
453....666, 674
454....679, 875, 879
455....316, 680
456....680
457....138, 680
458....681, 875, 879
459 and 460....692
461....702
462....702, 784
463....702
464....703
465....176, 703
466 and 467....703
468....175, 704
469....704
470....705
471....707
472....714
473 and 474....730
475....731
476, 477, and 478....780
479, 480, 481, and 482....781
483....783
484....784
485, 486, 487, 488, and 489....785
490 and 491....786
492....200, 201, 786
493....786
494....786-7
495 and 496....787
497, 498, 499, 500, 501, and 502....789
503, 504, 505, 506, 507, and 508....790
509....790-1
510, 511, 512, and 513....791
514, 515, 516, 517, and 518....792

Page.

Mines by Nos.:
- 519 and 520 793
- 521, 522, and 523 792
- 524 793
- 525, 526, and 527 792
- 528 and 529 793
- 530 794
- 531, 532, 533, 534, 535, and 536 794
- 537 814
- 538 .... 814, 877, 880
- 539 and 540 815
- 541 818
- 542 and 543 819
- 544 .... 201, 819
- 545, 546, 547, and 548 820
- 549 .... 205, 820
- 550 829
- 551 829-30
- 552 and 553 830
- 554 830-1
- 555 and 556 831
- 557 and 558 832
- 559, 560, and 561 835
- 562 847
- 563, 564, 565, 566, and 567 848
- 568 849
- 569 .... 207, 852
- 570 853
- 571 .... 205, 853
- 572, 573, 574, and 575 854
- 576 .... 219, 855
- 577 .... 219, 220, 855
- 578 and 579 855
- 580, 581, and 582 856
- 583 and 584 857
- 585 .... 219, 857
- 586 and 587 857
- 588 .... 215, 858
- 589 858-9
- 590 858
- 591 and 592 859
- 593 860
- 594 and 595 863
- 596 .... 205, 864
- 597, 598, and 599 864
- 600, 601, and 602 865
- 603 866

Mines, Production of Coal and Coke by (1916) 377-9

Mingo County, Dingess Sections, Revised 925-7

Mingo County, Revisions in Correlation, Kanawha Group 925-8

Mingo County Sections 286-9, 925-7

Minimum River Stages, Charleston 7

Minor Artificial [illegible] 42

Minter, W. F. 667

Miscellaneous Items 18-26

Miscellaneous Items, Steaming Tests 544, 774

Mississippian (Mauch Chunk Series) (Chapter IX) 222-5

Mississippian, Oil and Gas Sands of 337-8

Mississippian Period 97

Mississippian Rocks, Thickness 221-3

Mohawk Coal .... (See Eagle Coal)

Monitor (Logan) Sandstone 103, 167, **252**, 343

Monitor Sandstone, Lower 103, **252**

Monongahela Series, Oil and Gas Sands 337

Montgomery, Description 21-23

Montgomery, Gaging Records at 40-42

Montgomery Heirs No. 1 Well (11) .... 336, 339, 340, 341A, 347, 350-1, 352, 357.

Montgomery Heirs No. 2 Well (12) 341A, 347, 351-2, 364

Montgomery, Henry 22

Montgomery, James 22

Montgomery Quadrangle, Levels 943-4

Montgomery Section 88

Montgomery, S. H., J. C., and J. W. 22

Monthly Discharge, Estimated, of New River at Fayette 53, 55, 58

Monthly Temperature and Precipitation at Beckley 31

Monthly Temperature and Precipitation at Powellton 30

Moore, A. M. 703, 704

Morgan & Mathers 66, 75, 82

Mornton, D. H. 608, 639

Morris Creek 38

Morris Creek Coal Co. 467, 523

Morris Creek Section 145-6, 222

Morris E. L. 517, 518

Morris, Levi 21

Morton and Matthews Mine (100) 137, 679, 875, 879

Morton, F. H. 640, 641, 642

Moseley, A. D. 778

Moses, John 818

Moss Branch Coal Co. 706

Mossy Coal & Land Co. Core Test (54) 388B, 404

Mossy Coal & Land Co. No. 6 Core Test (53) 388B, 417-19

Mossy Creek 36

Mount Carbon Co., Ltd.:
- Exposure (379) 628
- Excelsior Mine (16) 485
- Opening (382) 635
- Pluto Mine (16A) 539
- Production 378, 384
- Prospect (351) 604
- South Vulcan Mine (59) 601
- Vulcan Mine (58) .... 264, 581-600, 873, 878, 881, 882, 883, 895.

Mount Carbon Mine (7) 468, 871, 878

Page.
Mount Carbon No. 1 Mine (78) 627
Mount Carbon Section.......88, 147-8, 222
Mount Hope Coal & Coke Co. Mine (171)................777-8
Mount Hope Coal & Coke Co., Production 378
Mount Hope, Description....26-27
Mountain Cove District:
  Area 19
  Detailed Boring Records..401-3
  Drainage Basins, Area....37-38
  Lower Douglas Coal........ 277
  Minable Coals.............. ....(See Minable Coals)
  Population 19
  Prospective Oil and Gas Areas 349-50
  Road Mileage.............. 16
  Sections 169-174
  Stratified Shales........... 906
Mud Tunnel Drift (216)...... 839
Muddlety Creek, Indicated Horse-Power Developed by.. 918
Muddlety Creek, Selected Reservoir Site............. 920
Mulvane—1 Mile Southwest Section...........88, 173-4, 222
Myles, Geo.................. 852

Mc

McCreath, A. S...........830, 831
McClung, A. W., Opening (506) 790
McCoy, John................. 26
McCoy, Jos., Core Test (73).. ....388B, 404
McCreery Well (17).....341A, 356
McDaniel, W. L.............. 784
McGraw, Andrew, Opening (33) 576
McKell Coal & Coke Co....... 737
McKell Coal & Coke Co.:
  Derryhale Mine (163)...... ......764-7, 876, 879, 890, 895
  Kilsyth Mine (172)........ ....778-9, 876, 879, 891, 895
  Production 378
McKell Coal Co......738, 770, 772
McKell Estate........730, 731, 813
McKell Estate (Dunglen) Mine (193) 813, 877, 880
McKell, T. G................ 26
McKell, William.........26, 388B
McKell, Wm., Openings (479 and 480).................. 781
McKendree Well (17A)..341A, 356
McKinley Land Co........... ....388, 388B, 555, 644
McKinley Land Co.:
  Core Test (63)........388B, 404
  Core Test (64)........388B, 404
  Core Test No. 2 (65).388B, 423
McKinley Land Co.: Page.
  Core Test No. B (68)...... ....388B, 425-6
  Core Test (78)........388B, 404
  Core Test (91)........... 388B
  Opening (95)..194, 661, 874, 879
McMichen, J. H., Opening (346) 577
McPheeters, W. I............ 782

N

Naiadites carbonaria Dawson? 292
Naphthalene, Yield of........ 542
Natural Gas and Petroleum (Chapter X)............336-373
Naugatuck Sandstone.102, **246,** 928
Navigation Suspended on Kanawha River, Days.......... 4
Neff, J. F., Opening (96)..... ....668, 875, 879
Neff, Mrs. Lura.............. 849
Neff, Laviro, Opening (505).. 790
Nelson, A. L................. 737
New River..............33, 37, 38
New River:
  At Fayette, Gaging Records 44-66
  Description 4, 42-66
  Estimated Monthly Discharge at Fayette...53, 55, 58
  Indicated H. P. Developed by 917
  Indicated H. P. Developed by Minor Tributaries..... 919
  Rating Tables.........50, 52, 54
  Reservoir Site, Selected.... 920
New River & Poca. Cons. Coal Co. 327, 388, 388A, 388C, 442, 446, 449, 794
New River & Poca. Cons. Coal Co.:
  Core Test (50A)......388A, 404
  Core Test No. 1 (118)......388C
  Core Test No. 2 (117)......388C
  Core Test No. 3 (126)......388C
  Core Test No. 4 (125)......388C
  Core Test No. 5 (119)...... ....388, 388C, 447-8
  Core Test No. 6 (138)......388C
  Core Test No. 7 (135).... 388C
  Core Test No. 8 (132)....388C
  Core Test No. 9 (133)....388C
  Core Test No. 10 (124)....388C
  Core Test No. 11 (124A)...388C
  Core Test No. 12 (129)....388C
  Core Test No. 13 (134)....388C
  Core Test No. 14 (123)....388C
  Core Test No. 15 (122)....388C
  Core Test No. 16 (136).... ....216, 217, 388C
  Core Test No. 17 (121)....388C
  Core Test No. 18 (116)....388C
  Core Test No. 19 (112).... ....203, 204, 388C, 448-9
  Core Test No. 20 (113)....388C

Page.
New River & Poca. Cons. Coal Co.:
  Core Test No. 21 (120)....................388, 388C, 448
  Core Test No. 22 (115)....388C
  Core Test No. 23 (127)....388C
  Core Test No. 24 (140)....388C
  Core Test No. 1NS (141)..388C
  Core Test No. 2NS (142)..388C
  Core Test No. 3NS (139)..388C
  Core Test No. 5NS (131)..388C
  Core Test No. 6NS (130)..388C
  Core Test No. 7NS (128)..388C
  Core Test No. 8NS (114)..388C
  Layland No. 1 Mine (218)........844-5, 894, 896, 897, 899
  Layland No. 2 Mine (219)........845-6, 894, 896, 897, 899
  Layland No. 3 Mine (220)........846-7, 894, 896, 897, 899
  Minden Mines.........722-4, 887
  Minden No. 2 Mine (142)... 721-4, 876, 879, 881, 882, 887, 895, 897, 899.
  Minden No. 3 Mine (141)... 719, 720-1, 887, 895, 897, 899
  Minden No. 4 Mine (140).. 719-20, 721, 887, 895, 897, 899
  Minden No. 5 Mine (139)........718-19, 887, 895, 897, 899
  Opening (532)............. 794
  Opening (223)..858, 859, 877, 880
  Production 378
  Prospects (517, 518, 521, and 522) 792
  Prospects (523, 525, 526, 527, and 530)................ 792
  Prospects (533, 534, 535, and 536) 794
  Prospects (560 and 561).... 835
  Prospect (581)............. 856
  Prospect (584)............. 587
  Prospect (585).........326, 857
  Prospects (591 and 592).... 859
  Prospect (593)..............860
  Rend, W. P., (Formerly) Mine (190)............... 811
  Rend, W. P., (Formerly) (No. 1) Mine (191).........811-12, 877, 879, 892, 895
  Sandstone Quarry.......... 298
  Weirwood Shaft Mine (174) 192, 195, 298, 423, 782, 876, 879
New River Coal & Coke.:
  Macdonald Mine (168)..... 311, 378, 711-6, 780, 876, 879, 881, 882, 891, 895, 897, 899
  No. 1 Mine (164) 767, 876, 879, 897, 898
  No. 2 Mine (165)........................767-9, 890-1, 895
  No. 3 Opening (477)........ 780
  No. 5 Mine (166) 770
  Opening (478) 780
  Sandstone Quarry.......... 311
New River Collieries Co.............388, 388A, 388C, 429

Page.
New River Collieries Co.:
  Core Test No. 2 (151)..........................388C, 455
  Core Test No. 65 (45)........................388A, 415-16
  Core Test No. 66 (46)........................388A, 416-17
  Core Test No. 67 (42)........................388A, 414-15
  Core Test No. 68 (41)........................388A, 413-14
  Core Test No. 69 (44) 388A, 404
  Core Test No. 70 (43) 388A, 404
  Production 378
  Sun No. 1 Mine (161)...... 747-763, 876, 879, 881, 882, 889-90, 895, 897, 898.
  Sun No. 2 Mine (162)......763-4
New River Colliery Co. Slater Mine (240).........828, 877, 880
New River Co................ 388B, 427, 428, 432, 433, 435, 436
New River Co.:
  Carlisle Shaft Mine (158)... ..189, 190, 743-4, 745, 889, 895
  Collins Mine (155).......... 738-9, 876, 879, 881, 882, 888, 895, 897, 899
  Lochgelly (Stuart) Mine (143).724-6, 876, 879, 887, 895
  Oakwood Shaft (159)...... ..744, 745-6, 876, 879, 889, 895
  Opening (426)............ 661
  Scarbro Shaft Mine (160)..........746-7, 889, 895, 897, 898
  Summerlee (Parral) Mine (144).................. 413, 726-7, 876, 879, 887-8, 895
  Whipple Shaft (157).......................742-3, 889, 895
New River Group............ 97
New River Group:
  Chapter VII............294-322
  Correction in Division Line Between Kanawha Group. 99-100
  Description of Members.295-322
  General Account...........294-5
  General Section...........106-9
  Minable Coals...........676-849
  Thickness 221-3
New River Mining Co........ 686
New River Silica Co., Quarry 911-12, 913
New River Smokeless Coal Co. ...747, 755, 761, 762, 806, 808, 809
New River Valley Coal Co. Mine (127)....... .705, 875, 879
Newlyn Coal Co.............. 686
Newlyn Coal Co.:
  Newlyn (Thomas) Mine (192) ..378, 812-13, 877, 879, 892, 895
  Opening (474)............ 730
  Production 378
Newman No. 1 Well (9)...... 133, 134-5, 336, 339, 341A, 346, 348.
Nichol Colliery Co., Nichol Mine (155A)...................378, 740-1, 876, 879, 889, 895
Nicholas County Elevations.. 932

Page.
Nicholas County Sections.... ....136, 139, 141, 142, 175
Nicholas County Well Records 341A, 342-6
Nicholas Quadrangle.......... 939
No. 5 Block (Lower Kittanning) Coal................. 88, 99, 114, 115, 116, 117, 118, 119, 124, 135, 144, 146, 147, 152, 158, 166, 170, 226, 227, 228-9, 232, 234, 375, 386, 456, 458, 460, **461-9, 867, 871**
No. 6 Block Coal............. ...(See Middle Kittanning Coal)
No. 2 Gas Coal............... 88, 89, 90, 92, 93, 103, 115, 119, 121, 122, 123, 124, 125, 126, 127, 128, 129, 131, 132, 133, 139, 141, 145, 147, 149, 150, 151, 152, 154, 155, 156, 159, 161, 163, 164, 165, 167, 171, 173, 188, 190, 191, 192, 193, 237, 239, 246, 249, 250, 251, **253-4**, 255, 256, 257, 258, 259, 260, 263, 268, 273, 342, 343, 345, 347, 351, 352, 354, 362, 366, 368, 371, 373, 375, 386, 388A, 389, 390, 391, 392, 393, 394, 395, 397, 399, 402, 470, 495, 496, 497, **498-578**, 602, 603, 613, 616, 623, 630, 635, 644, **867, 871-3, 883**
No. 2 Gas Coal, Intervals Above and Below.......... 88
No. 1 Pocahontas Coal....... ....111, 211, **330**, 387
No. 2 Pocahontas Coal........ ......111, 216, 219, 329, **330**, 387
No. 2 "A" Pocahontas Coal.. ....110, **330**
No. 3 Pocahontas Coal....... 89, 110, 112, 177, 182, 197, 198, 199, 205, 210, 211, 216, 218, 219, 323, 324, 325, 327, 328, **329**, 330, 334, 335, 387, 388B, 388C, 430, **861-6, 867, 877**
No. 3 Pocahontas Coal, Roof Shale..............281, 282, 285
No. 3 "Rider" Pocahontas Coal 110, **328-9**
No. 4 Pocahontas Coal........ 89, 110, 210, 216, 219, **328**, 329, 387, 430
No. 5 Pocahontas Coal........ ....110, 218, 328
No. 6 Pocahontas Coal........ 88, 89, 110, 177, 197, 198, 199, 202, 203, 204, 205, 208, 210, 213, 214, 215, 217, 218, 219, 220, 221, 323, 324, 325, 326, **327**, 328, 329, 375, 387, 388B, 388C, 430, 432, 435, 450, 451, 454, **850-860, 867, 877**
No. 7 Pocahontas Coal....... 109, 177, 199, 217, 324, **325**, 327, 387, 430, 450, 454

Page.
No. 8 Pocahontas Coal....... 109, 199, **322**, 323, 449, 451, 452, xxxi, xxxii.
No. 9 Pocahontas Coal........ 109, 177, 199, 209, 321, **322**, 323, 421, 449, 451, 453
Normal Monthly, Seasonal and Annual Temperature and Precipitation at Beckley.... 31
Normal Monthly, Seasonal and Annual Temperature and Precipitation at Powellton.. 30
North Coalburg Coal......... ...(See Middle Kittanning Coal)
North Coalburg (Shrewsbury) Section 116-17, 223
North Fork Shale............ ....111, 281, 282, 283, 285, **330-1**
North Point of Fayette County Section 88
Number of Mines by Coal Beds 375
Nuttall District:
  Area 19
  Bonds Voted for Roads..... 16
  Detailed Boring Records...403-4
  Drainage Basins, Area.....37-38
  Lack of Test Wells........355-8
  Minable Coals.............. ....(See Minable Coals)
  Population 19
  Prospective Oil and Gas Areas 358-9
  Road Mileage.............. 16
  Sections 174-180
Nuttall Estate (James Walker) Opening (125).702-3, 875, 879
Nuttall Estate Opening (502)..789
Nuttall Heirs.....388A, 388B, 697
Nuttall Heirs:
  Core Test (18).....174, 175, 388A
  Core Tests (19, 20, 21, and 22) 388A
  Core Test (24)..............388A
  Core Tests (95 and 96)....388B
  Water Well (23)..........388A
Nuttall, John................ 21
Nuttall Mine, Production.379, 384
Nuttall Sandstone...........xxiv
Nuttall Sandstone, Lower.... 88, 89, 107, 129, 130, 137, 138, 140, 142, 159, 165, 167, 172, 174, 175, 177, 178, 179, 180, 181, 184, 187, 192, 195, 274, 278, 295, **297-9**, 300, 301, 302, 303, 304, 305, 345, 347, 350, 352, 353, 354, 362, 365, 366, 367, 369, 370, 371, 396, 397, 398, 399, 400, 402, 404, 405, 406, 407, 408, 409, 410, 411, 412, 417, 419, 420, 421, 422, 425, 426, 427, 428, 429, 432, 435, 436, 438, 439, 441, 680, 906, 910, 911. 913, xxiv, xxvi, xxviii, xxxi, xxxii
Nuttall Sandstone, Upper..... 88, 89, 106, 123, 128, 129, 130, 134, 137, 138, 140, 142, 143, 149, 159,

Page.
Nuttall Sandstone, Upper.... 165, 167, 172, 174, 180, 181, 184, 185, 187, 188, 190, 192, 195, 230, 271, 272, 276, 277, 278, 294, **295-6,** 297, 298, 299, 300, 301, 344, 347, 350, 352, 354, 362, 365, 366, 369, 371, 398, 399, 400, 401, 402, 406, 408, 409, 411, 412, 427, 435, 436, 438, 439, 532, 533, 674, 680, 745, 910, 911, xxiv, xxvi, xxx
Nuttallburg Coal & Coke Co. 688, 689
Nuttallburg Mine (109)...... ....179, 688, 875, 879
Nuttallburg Section.89, 179-80, 222
Nuttallburg Smokeless Fuel Co., Nuttallburg Mine (109) 179, 688, 875, 879
Nuttallburg Smokeless Fuel Co., Production.........379, 384
Nutter Heirs................388A
Nutter, O. R................. 603

O

Oak Hill, Description........24-25
Oakland Mine, Production.... 379
Oakwood Mine, Production... 379
Oakwood Shaft Mine (159)... ...744, 745-6, 876, 879, 889, 895
Oceana Limestone....105, **268,** 270
Ohio Cities Gas Co........... .....336, 341, 341A, 359, 361, 362
Ohio Fuel Oil Co....122, 341, 341A
Oil- and Gas-Bearing Sands, Description 338-340
Oil and Gas (Chapter X)..336-373
Oil and Gas Development in Kanawha County, Recent... 359-372
Oil and Gas Horizons in W. Va. 336-8
Oil and Gas Zones in W. Va., Table 337-8
Oiler, John, Opening (266)...458-9
Old Keeney Mine, Production. 377
Once More Mine, Production.. 379
O'Neal, H. H................. 778
O'Neil & Chapman........... 76
O'Neill, W. M................ 59
Ontario Power Co............ 921
Opossum Creek.............. 35
Order of Production of Coal by Counties (1897-1916).... 380
Order of Production of Coke by Counties (1897-1916).... 382
Original Forests.............. 922
Osborne Creek............... 35
Osborne, H. W............... 820

P

Packs Branch 36
Paddy Branch............... 38
Page, Maj. Wm. N. ..21, 170, 533
Page Mine (No. 7 Opening) (51) 538-548, 630, 635, 872, 878, 883, 895
Page Section........88, 162-3, 222
Paint Creek................36, 38
Paint Creek Branch, C. & O. R. R..................... 11
Paint Creek Branch, C. & O. R. R., Levels.............. 932
Paint Creek Coal Mining Co. No. 3 Mine (336A)..550, 873, 878
Paint Creek Colliery Co. Hickory Camp Mine (80)....... ....636-7, 874, 878
Paint Creek Colliery Co. Mine (62) 604
Paint Creek, Indicated H. P. Developed by.............. 919
Paint Creek Land & Coal Co. No. 1 Well (32).......341A, 364
Paint Creek Land & Coal Co. No. 2 Well (33)...........341A
Painter No. 1 Core Test (56) 388B, 419-20
Paleozoic Age................ 97
Panther Mountain Section.... ....141-2, 222
Panther Sandstone........... (See Upper Nuttall Sandstone)
Parish, Allen, Opening (344).. 576
Parker, D. J..........506, 508, 847
Parker, E. W................ 543
Parker, G. L................. 59
Parral (Summerlee) Section.. ....88, 89, 186-7, 222
Parral (Summerlee) Shaft Mine (144)................ 413, 656, 725, 726-7, 876, 879, 887-8, 895
Parrish, William............ 24
Part I—History and Physiography 1-85
Part II—Geology...........86-335
Part III—Mineral Resources. 336-924
Patterson, Mrs. A. B., Opening (248) 368
Patton, Leicester.........539, 680
Paul, E. G.................. 55
Peerless Coal................ 88, 103, 115, 119, 120, 123, 127, 132, 139, 141, 145, 147, 151, 152, 153, 156, 161, 163, 167, 191, 193, 251, **253-4,** 375, 386, 389, 391, 394, 397, 470, 495, **498-578, 867, 871-3,** 883
Peerless Sandstone... .... 103, 115, 117, 118, 120, 121, 124, 127, 133, 141, 145, 147, 153, 156, 159, 171, 193, **251,** 252, 288, 389, 394
Penfield Branch..... 38
Pembrook Mine (195). 818

Page.
Pennsylvania Geological Survey 224, 226, 228, 231
Pennsylvanian, Oil and Gas Sands of.................. 337
Pennsylvanian Period........ 97
Pennsylvanian Rocks, Thickness 221-3
Perry, G. W., Opening (419).. 657
Personal Property, Value..... 20
Perwien & Bailey............ 71
Peshak, R. E................ 592
Peters Creek, Mouth of, Section 138, 222
Peters Creek—0.7 Mile South of Mouth, Section......... 88
Peters, David E.............. 785
Peters, D. E..............784, 785
Peterson & Walters.....64, 74, 82
Petroleum and Natural Gas (Chapter X).............336-373
Petroleum and Natural Gas.. ....(See Oil and Gas)
Phillips, John............... 505
Phoenix Coal Co. Slater Mine (204) 828, 877, 880
Physiographic Changes.......32-37
Physiography and History (Part I)...................1-85
Physiography (Chapter II)...32-85
Pierce, Thomas.............. 458
Pierpont Sandstone.......... ....110, 177, 210, **325-6,** xxix
Pierson, A. E...............60, 62
Pine Top Mine (54)..575, 873, 878
Pinetop Entry of Low Moor No. 2 Mine (471)........... 707
Pineville Sandstone.......... 89, 109, 160, 182, 197, 198, 199, 201, 202, 203, 204, 206, 208, 209, 211 213, 214, 215, 217, 218, 219, **321-2,** 323, 324, 354, 370, 400, 432, 447, 455, 820, 857, 910, 912, 913, xxvii, xxix, xxxi
Piney Creek, Indicated H. P. Developed by.............. 919
Pinkney, H. H............... 779
Platt, Franklin...........225, 226
Pleurophorella sesquiplicata, sp. n......................290-1
Plum Orchard Coal & Land Co. 388, 388B, 419
Plum Orchard Coal & Land Co.:
  Core Test (59).............388B
  Core Test (60)......388B, 421-2
  Core Test (70)........388B, 404
  Core Test (72)........388B, 404
  Core Test (77)......388B, 429-31
Plumorchard Creek.......... 36
Pluto Coal.................. 335
Pluto Mine (16A)........378, 529
Pocahontas Coals............ (See Nos. 1-9 Pocahontas Coals)
Pocahontas Folio (No. 26)... 333
Pocahontas Group........... 97

Page.
Pocahontas Group:
  Chapter VIII............323-331
  Description of Members.324-331
  General Account...........323-4
  General Section.........109-111
  Minable Coals...........849-866
  Thickness 221-3
Pocahontas Sandstone, Lower 110, 211, **329**
Pocahontas Sandstone, Upper 110, 210, 211, 219, **328,** 329, 430, 865, xxix
Pocono Sandstones........... 97
Pocono Sandstones, Oil and Gas Sands of.............. 337
Pocono Sandstones, Thickness 221-3
Pocotaligo River, Indicated H. P. Developed by........... 919
Point Coal.....(See Chilton Coal)
Pope, G. S............539, 630, 772
Popenose Tunnel............. 307
Population 19-20
Population by Districts...... 19
Population of Unincorporated Villages 28-29
Portage and Chemung, Oil and Gas Sands of.............. 338
Porter, J. R................. 725
Potato Hill Knob Section..... ....88, 190-2, 223
Pottsville Series............. 97
Pottsville Series:
  Chapter VI (Kanawha Group) 230-293
  Chapter VII (New River Group) 294-322
  Chapter VIII (Pocahontas Group) 323-331
  General Section..........100-111
  General Section, Revised..927-8
  Intervals to Base of......88, 89
  Kanawha Group, Minable Coals 470-676
  List of Invertebrate Fossils 281-2
  New River Group, Minable Coals 676-849
  Oil and Gas Sands......... 337
  Pocahontas Group, Minable Coals 849-866
  Thickness 221-3
Powell, G. H................. 485
Powellton "A" Coal.......... 104, 156, 167, **256,** 386, 389, 397
Powellton Branch, C. & O. R. R. 11
Powellton Branch, C. & O. R. R., Levels................. 932
Powellton Coal.............. 88, 104, 121, 125, 127, 129, 131, 132, 139, 148, 150, 151, 154, 155, 156, 161, 163, 164, 165, 167, 171, 173, 191, 194, 255, **256,** 257, 259, 264, 362, 368, 375, 386, 389, 390

Page.

- Powellton Coal................ 391, 392, 393, 394, 395, 397, 470, 529, 532, **578-613, 867, 873, 883**
- Powellton Fork—Head of, Section 161-2, 223
- Powellton Mine, Production... 377
- Powellton—0.5 Mile Northwest Section...............156-7, 223
- Powellton Section..88, 158-161, 223
- Powellton, Temperature and Precipitation at............ 30
- Powellton Well (14)......... ....157, 159-161, 341A, 352-3, 354
- Precipitation at Beckley..... 31
- Precipitation at Powellton.... 30
- Preparatory Branch, W. Va. University 22-23
- Present Development (Water-Power 913-14
- Present Forest Conditions.... 923
- Present Surface Formation... 97
- Preston County (Rowlesburg) Section 237-9
- Price Hill Coal Co........... 780
- Price Hill Fuel Co.:
  - No. 4 Core Test (80)..388B, 432
  - No. 6 Core Test (81)...... ....388B, 433-5
  - No 7 Core Test (83)...388B, 436
  - No. 9 Core Test (82)..388B, 435
- Price, T. H.................. 911
- Price, Wm. Armstrong....... 234, 237, 240, 248, 249, 265, 280, 283, 286
- Price, Wm. Armstrong—Type Locality of Winifrede Limestone 286-293
- Princeton Conglomerate Sandstone 89, 111, 113, 135, 206, 208, 210, 212, 214, 216, **333-4**, 338, 356, 359, 420, 910
- Probable Amount of Coal:
  - Alma 498, 867
  - Campbell Creek........578, 867
  - Cedar Grove...........492, 867
  - Chilton 487, 867
  - Coalburg 480, 867
  - Douglas 676, 867
  - Eagle 647, 867
  - Fire Creek.............849, 867
  - Gilbert 672, 867
  - Glenalum Tunnel.......662, 867
  - Little Eagle............658, 867
  - Middle Kittanning (North Coalburg) 461, 867
  - No. 2 Gas..............578, 867
  - No. 3 Pocahontas.......866, 867
  - No. 5 Block (Lower Kittanning) 469, 867
  - No. 6 Pocahontas.......860, 867
  - Peerless 578, 867
  - Powellton 613, 867
  - Sewell 795, 867
  - Stockton 471, 867
  - Winifrede 483, 867
- Producer-Gas Tests:
  - Eagle Coal................ 634
  - No. 2 Gas Coal.....544-5, 565-72
  - Powellton Coal...........589-98
  - Sewell Coal..............755-61
- Producing Sands, Oil and Gas 341A
- Production, Coal (1888-1916).. 375
- Production, Coal, Order, by Counties (1897-1916)....... 380
- Production, Coal and Coke, by Mines (1916)..............377-9
- Production, Coke, by Companies (1916)................ 384
- Production, Coke, by Counties (1916)................ 381
- Production, Coke, by Years (1897-1916) 383
- Production, Coke, Order by Counties (1897-1916)....... 382
- Production, Statistics, Coal and Coke................374-385
- Products 20
- Property Valuation........... 20
- Prospective Areas and Well Records 340-373
- Prospective Oil and Gas Areas:
  - Falls District.............348-9
  - Fayetteville District....... 373
  - Kanawha District.......... 355
  - Mountain Cove District...349-50
  - Nuttall District...........358-9
  - Quinnimont District.......358-9
  - Sewell Mountain District..358-9
- Prudence Coal Co.:
  - Blue Jay Mine (150)....... 729
  - Jones Mine (146).......... 729
  - Lyman Mine (149).......... 729
  - Opening (475).............. 731
  - Production 379
  - Prudence Mine (151)....... 731-2, 876, 879, 888, 895, 897, 898, 900

Q

- Quakertown Coal.236, 237, 239, 263
- Quantity of Coal Available:
  - Alma 497-8
  - Campbell Creek........... 578
  - Cedar Grove..............491-2
  - Chilton 487
  - Coalburg 480
  - Douglas 676
  - Eagle 647
  - Fire Creek............... 849
  - Gilbert 671-2
  - Glenalum Tunnel..........661-2
  - Little Eagle..............657-8
  - Middle Kittanning (North Coalburg) 460-1
  - No. 2 Gas................ 578
  - No. 3 Pocahontas......... 866
  - No. 5 Block (Lower Kittanning) 469
  - No. 6 Pocahontas......... 860
  - Peerless 578

Page.
Quantity of Coal Available:
  Powellton 612-13
  Sewell 795
  Stockton 474
  Winifrede 483
Quantity of Coal Available, Summary 867
Quarrier Mine (115A)....... ....693-4, 875, 879
Quarries, Glass-Sand........911-12
Quarries, Sandstone, by Nos.:
  1 ....268, 910
  2 and 3.................273, 910
  4, 5, 6, and 7...........296, 910
  8 ....298, 910
  9 ....334, 910
Quarries, Sandstone, Table.... 910
Quaternary Age............97, 98
Quaternary Deposits.........905-6
Quinnimont Coal............. ....(See Fire Creek Coal)
Quinnimont Coal Co.:
  Big "Q" Mine (213)........ ....836, 877, 880, 893-4, 896
  Mine (208)................ ....212, 319, 831-2, 881, 882
  Old Drifts (557 and 558)... 832
  Production 379
Quinnimont District:
  Area 19
  Detailed Boring Records... 449-455
  Drainage Basins, Area....37-38
  Lack of Test Wells........355-8
  Minable Coals............. ....(See Minable Coals)
  Population 19
  Prospective Oil and Gas Areas 358-9
  Road Mileage............. 16
  Sections 205-220
  Stratified Shales........... 907
  Well Records..............341A
Quinnimont—North Side Section 211, 223
Quinnimont Sandstone........ 109, 134, 169, 176, 179, 196, 199, 201, **318,** 319, 354, 400, 401, 411, 421, 424, 436, 434, 446, 448, xxvii, xxix
Quinnimont Shale............ 109, 196, **318,** 446, 447, 448, 454
Quinnimont—South Side Section 212, 223

R

Rader Ford, Meadow River 202, 223
Rafter, R. O................. 706
Railroad Levels...........929-935
Railroads, Steam 9-15
Raine, T. W................. 934
Rainelle—1 Mile Northwest Section 89

Page.
Rainfall at Charleston........ 5
Raleigh "A" Coal, Little..... 108, 199, **315,** 387, 400, 440, 454
Raleigh Coal, Little.......... 88, 89, 108, 168, 172, 176, 182, 201, 205, 217, 313, **315-16,** 352, 370, 387, 396, 397, 400, 413, 415, 416, 421, 424, 428, 429, 434, 440, 444, 447, 452, 454, 455, 679, xxvii, xxxi
Raleigh County, Detailed Core Tests............432-42, 449-55
Raleigh County Levels....935, 946
Raleigh County Report........ 166, 192, 206, 208, 242, 254, 270, 280, 315, 326, 335, 354, 356, 357, 421, 422, 423, 424, 425, 426, 427, 428, 429, 432, 433, 435, 436, 437, 438, 439, 440, 441, 442, 449, 450, 451, 452, 453, 454, 455, 552, 555, 781, 782, 814, 828, 829, 830, 831,
Raleigh County Sections.... ....207, 208, 209
Raleigh County Well Records 341A, 354-5
Raleigh Folio (No. 77)...... ..272, 295, 304, 307, 313, 317, 318
Raleigh (30') Quadrangle, Levels 944-5, 946
Raleigh Sandstone, Lower.... 89, 109, 134, 168, 176, 179, 182, 198, 199, 204, 205, 209, 218, 239, 314, 315, **317,** 352, 353, 354, 365, 366, 367, 369, 396, 400, 410, 412, 413, 418, 419, 421, 424, 428, 431, 434, 444, 446, 447, 448, 452, 453, 454, 455, 910, 913, xxviii
Raleigh Sandstone, Upper.... 88, 89, 108, 128, 134, 137, 138, 168, 172, 176, 178, 179, 180, 181, 196, 197, 198, 199, 200, 201, 202, 203, 204, 211, 213, 214, 217, 239, 298, 310, 311, 312, 313, **313-14,** 316, 317, 345, 350, 352, 353, 354, 365, 366, 367, 369, 370, 371, 396, 399, 403, 410, 411, 413, 415, 416, 417, 418, 419, 420, 424, 428, 429, 431, 434, 440, 441, 444, 448, 452, 454, 455, 680, 813, 848, 906, 910, 911, 912, 913, xxvii, xxviii, xxxi
Ramsay, A. C................ ......689, 693, 695, 698, 709, 799
Ramsey Branch............. 39
Rand-McNally 29
Range and Distribution of Fossils 281-2
Rate of Fall of Streams.....33-36
Ravenseye Anticline..93, 358, 359
Ravenseye Section........200, 223
Rawn, J. C.................. 165
Real Estate, Value........... 20
Recent Oil and Gas Development in Kanawha County.. 359-372
Recent Period................ 97
Records, Coal Test........385-455

Page.
Records, Coal Test, Summarized..385, 388, 388A, 388B, 388C
Records, Summarized Well... ....340-1, 341A
Records, Well, and Prospective Areas..............340-373
Recoverable Coal............. 868
Red Ash Mine (187)......... ....379, 717, 798-9, 892, 895
Red Jacket Coal............. ....(See Cedar Grove Coal)
Red Structure Contours...... ....86-7, 310-11
Reeder, C., Heirs, Core Test (10) 388A, 396
Reeder, C., Heirs, Core Test (11) 388A, 397
Reeder, Chas., Heirs......... 914
Reforestation, Areas Suitable for 923-4
Reger, D. B.................. 115, 116, 140, 235, 236, 237, 240, 242, 243, 244, 245, 246, 247, 248, 249, 250, 251, 252, 254, 256, 259, 261, 262, 263, 265, 266, 267, 268, 269, 271, 276, 306, 310, 334, 336, 342, 343, 513, 516, 517, 518, 619, 620, 679, 681, 926
Register of Localities.......283-5
Relief 19
Rend Branch (Arbuckle Creek Branch), C. & O. R. R., Levels 931
Rend, W. P.......... ......388A
Rend, W. P., Core Test (50) 388A, 404
Rend, W. P., Mine (Formerly) (139) ..718-19, 887, 895, 897, 899
Rend, W. P., Mine (Formerly) (140) ..719-20, 887, 895, 897, 899
Rend, W. P., Mine (Formerly) (141) 719, 720-1, 887, 895, 897, 899
Rend, W. P., Mine (Formerly) (142) 721-4, 876, 879, 881, 882, 887, 895, 897, 899
Rend, W. P., Mine (Formerly) (190) 811
Rend, W. P., Mine (Formerly) (191).......811-12, 879, 892, 895
Representing Structure, Method of 86-90
Reservoir Sites, Selected, Kanawha River Basin........ 920
Residual Clay............... 906
Resources, Mineral (Part III) 336-924
Results of Tests 542
Retort Operation, Coal and Coke 541
Revised Drainage Section, Mingo County 926-7
Revised Section, Pottsville Series 927-8
Revisions in Correlation, Kanawha Group, Mingo County 925-8
Reynolds, W. C., Opening (436) 666
Rice, G. S................682, 772
Rich Creek................34, 39
Ridgeview Coal Co., Production 379
Ridgeview Coal Co., Slater Mine (204).........828, 877, 880
Ridgeview Mine, Production.. 379
Riefkin, P. M........725, 727, 749
Rift Shale...........109, **325**, 450
Riggs Branch............... 38
River and Creek Gravel...... 908
River Stages, Maximum, Charleston 6
River Stages, Minimum, Charleston 7
River Valley Colliery Co., Production 379
Road Bonds, Amount Voted.. 16
Road Material..............908-9
Road Material, etc., (Chapter XII) 904-924
Road Mileage...............15-16
Roads, Cost of Various Types 909
Roaring Creek Coal....... ....(See No. 5 Block Coal)
Roaring Creek Sandstone..... ...(See Homewood Sandstone)
Robb, R. W................. 840
Robins Coal Co. Export Mine (209)...832-3, 877, 880, 893, 895
Robinson, William........151, 527
Rockcamp Branch.......... 79
Rock Lick Coal Co.......388, 388A
Rock Lick Coal Co., Production 379
Rocklick Coal Co.:
  Concho Mine (137).717, 876, 879
  Core Test No. 1 (48)...388A, 404
  Core Test No. 2 (47)...388A, 404
  Core Test No. 3 (49)...388A, 404
  Erskine Mine (189).810, 877, 879
  Rocklick Mine (138)....... 718
Rocks, Thickness of Stratified 221-3
Rogers, H. H................. 14
Rogers, W. B................ 233
Roof Shale of Eagle Coal... ....279, 281, 282, 284
Roof Shale of Little Eagle Coal......280, 281, 282, 283, 285
Roof Shale of No. 3 Pocahontas Coal...........281, 282, 285
Rosedale Mine (116)....379, 694
Rosedale Salt Sand 344
Rothwell Coal Co.:
  Dubree Mine (113)...... 696-7, 875, 879, 885, 895, 897, 898
  Production 379
  Quarrier Mine (115A). 693-4, 875, 879
  Rosedale Mine (116)...379, 694,
Rothwell, Herbert 694

Page.
Rowland Land Co. No. 1 Well (18)..........341A, 354-5, 373
Rowlesburg (Preston County) Section 237-9
Royal Coal & Coke Co., Royal Mine (207)....208, 829, 877, 880
Royal—Grandview Section.....................89, 209-10, 222
Royal Mine (207).208, 829, 877, 880
Royal No. 1 Core Test (150)...............209-10, 388C, 455
Royal No. 2 Core Test (151)........................388C, 455
Royal Section...........208, 223
Royal Shale.................. 110, 177, 182, 197, 199, 208, 210, 219, 281, 282, 284, 323, **326-7**, 855, 857
Rush Run.................. 39
Rush Run Mine (188)...................798, 799-810, 892, 895
Rush Run Mine, Production..........................379, 384
Russell Land Co. No. 10 Core Test (84)...........388B, 436-7
Russellville Gaging Station, Description.........................76, 78, 79-80, 81, 82, 83
Russellville Section.89, 176-7, 223
Rutledge, J. J............... 710, 718, 719, 720, 721, 735, 768, 772, 776, 827, 836, 838, 840, 844, 845, 846

S

St. Clair Coal & Coke Co..524, 626
St. Clair Coal & Mining Co... 233
St. Clair Coal & Mining Co., Archer Mine (8)......146, 467-8
St. Clair Coal Mining Co. Mine (77) 626-7, 874, 878, 881, 882, 897, 898
St. Clair Collieries Co........ 379
St. Clair Colliery Co......... 468
St. Clair Colliery Co. Mine (44)............524-5, 872, 878
St. Clair Mine, Production.... 379
Salt Sand.................... 362
Salt Sand, First......350, 366, 367
Salt Sand, Rosedale......... 344
Salt Sand, Second.......................350, 365, 366, 367, 368
Salt Sand, Third.....350, 366, 367
Sand, Available Glass......912-13
Sand Branch................. 39
Sands, Oil and Gas:
  Bayard 338
  Beckett 337
  Benson 336, 337, 338
  Berea 337, **340**
  Big Dunkard.............. 337
  Big Injun...............337, **339**
  Big Lime...............337, **339**
  Burning Springs.......... 337
  Cairo? 337
  Cairo Gas.................. 337

Page.
Sands, Oil and Gas:
  Cairo Salt................. 337
  Carroll 337
  Dawson 337
  Elizabeth 338
  Fifth 338
  Fifty-Foot 338
  First Cow Run............ 337
  Fourth 338
  Gantz 338
  Gas, of Marion............ 337
  Gordon 338
  Gordon Stray............. 338
  Keener 337, **339**
  Little Dunkard............ 337
  Little Lime............... 337
  Maxton 333, 337, **338-9**
  Minshall 337
  Moundsville 337
  Murphy 337
  McDonald 338
  Rosedale Gas.............. 337
  Rosedale Salt............. 337
  Second Cow Run.......... 337
  Seventh 338
  Sixth 338
  Speechley 338
  Squaw 337
  Thirty-Foot 338
  Tiona 338
  Warren First.............. 338
  Warren Second............ 338
  Weir 337, **340**
Sands, Oil and Gas, by Series:
  Allegheny 337
  Catskill 338
  Chemung 338
  Conemaugh 337
  Devonian 338
  Greenbrier Limestone...... 337
  Mauch Chunk.............. 337
  Mississippian 337
  Monongahela 337
  Pennsylvanian 337
  Pocono Sandstones......... 337
  Portage Beds.............. 338
  Pottsville 337
Sandstone 908-9
Sandstone:
  Bearwallow Conglomerate (Dotson) 271-3
  Bens Creek................ 261
  Brownstown 255
  Connoquenessing 236
  Decota 261
  Dingess 926, 927, 928
  Dotson (Bearwallow Conglomerate) 271-3
  Eagle 259-260
  East Lynn.................227-8
  Eckman 327-8
  Flattop Mountain..........324-5
  Grapevine 262-3
  Guyandot 307
  Harvey Conglomerate.....304-5
  Hernshaw 245

Page.
Sandstone:
  Homewood (Roaring Creek) 231-2
  Keystone 111
  Kittanning 229
  Landgraff 111
  Logan (Monitor).... 252
  Lower Campbell Creek.... 254
  Lower Cedar Grove (Peerless) 251
  Lower Chilton.... 245
  Lower Coalburg.... 240
  Lower Dotson....274-5
  Lower Freeport....99, 144, 225
  Lower Gilbert.... 269
  Lower Guyandot....309-10
  Lower Iaeger.... 303
  Lower Kittanning.... 238
  Lower Monitor.... 252
  Lower Nuttall (Upper Iaeger) 297-9
  Lower Pocahontas.... 329
  Lower Raleigh.... 317
  Lower War Eagle.... 266
  Lower Winifrede.... 242
  Matewan 259
  Middle Cedar Grove.... 250
  Middle Iaeger.... 303
  Monitor (Logan).... 252
  Naugatuck 246
  Panther (Upper Nuttall)..295-6
  Peerless (Lower Cedar Grove) 251
  Pierpont 325-6
  Pineville 321-2
  Princeton Conglomerate.... ....333-4, 338
  Quinnimont 318
  Roaring Creek (Homewood) 231-2
  Sharon (Upper and Lower Raleigh) 239, 314
  Upper Cedar Grove....248-9
  Upper Chilton.... 244
  Upper Coalburg....235-6
  Upper Connoquenessing.238, 239
  Upper East Lynn....225-6
  Upper Freeport.... 99
  Upper Gilbert....267-8
  Upper Iaeger (Lower Nuttall) 297-8
  Upper Nuttall (Panther)..295-6
  Upper Pocahontas.... 328
  Upper Raleigh....313-14
  Upper Winifrede....240-1
  Vivian 111
  Welch 311
  Williamson 247
Sandstone Quarries 198, 273, 296, 298, 311, 314, 334, 910
Sandstone Quarries ....(See Quarries by Nos.)
Sandstone Quarries, Table.... 910
Sanger, J. R., Core Test (51) 388A, 404

Page.
Sandy Huff Shale.... 305
Sawyer, W. C.... 55
Sayres, Ira G..314A, 350, 351, 370
Scarbro Shaft Mine (160).... ....379, 746-7, 889, 895, 897, 898
Schuyler Fork, Morris Creek, Section....146, 223
Schweitzer, J. N.... 745
"Science" 362
Scotia Coal & Coke Co., Production....379, 394
Scotia Coal Co.:
  Brooklyn Mine (135).... 714-17, 876, 879, 881, 882, 886-7, 895
  Cunard Mine (134).714, 876, 879
  Mine (136).... 717
  Red Ash Mine (187).... ....798-9, 892, 895
  Rush Run Mine (188).... ....798, 799-810, 892, 895
Scotia Mine, Production..377, 384
Scrabble Creek.... 39
Seacrist, H. W.... 605
Seasonal Temperature and Precipitation at Beckley.... 31
Seasonal Temperature and Precipitation at Powellton.... 30
Second Salt Sand.... ....350, 365, 366, 367, 368
Secondary Elevations.... 946
Sections:
  Alaska—0.8 Mile Southeast. 206, 221
  Albion—Woods Ferry.... ....139-140, 221
  Ansted—Hawks Nest.... ....88, 170-2, 221
  Beckwith—1.7 Miles West.. ....150, 221
  Belva—0.7 Mile South.... ....133-5, 221
  Belva—1 Mile Northeast... ....135-6, 221
  Beury 199-200, 221
  Beurytown 215-16, 221
  Bishop—0.6 Mile Northwest 188, 221
  Boggs Knob—Sims Station 218, 221
  Boomer 125, 221
  Boomer—¾ Mile East 126-7, 221
  Buffalo Creek (Mingo County) 288-9
  Buffalo Creek, Mouth (Mingo County) 286-8
  Cannelton 119-121, 221
  Carlisle 189-190, 221
  Carnifex Ferry .88, 89, 142-3, 221
  Cedar Grove....118-119, 221
  Columbia 152, 221
  Columbia—1.2 Miles S. 50° W. 153-4, 221
  Corliss—1 Mile North .201, 221
  Cotton Hill 180, 221
  Crescent 144-5, 221

Page.
Sections:
Danese 89
Deepwater 149, 221
Deepwater—½ Mile North 127-8, 221
Deitz 143, 221
Dingess, Mingo County, Revised 926-7
Divide 177-8, 221
Dogwood Ridge............. 88
Eagle—½ Mile South...146, 221
Elk Ridge..............155, 221
Fayetteville—1.5 Miles Northwest 183-4, 222
Faylas (Miller)......89, 175, 222
Gamoca 130-1, 222
Gauley Bridge—1 Mile Southeast 128-9, 222
Grandview—Royal 89, 209-10, 222
Harewood—¼ Mile Northwest 124, 222
Herberton (Willis Branch).. ....88, 89, 193-5, 222
Hickory Camp............. 88
Horseshoe Creek, Mouth of.... ....137, 222
House Branch of Bells Creek 136-7, 222
Johnson Fork, Head of...... ....163, 222
Kanawha Falls............. 88
Keeferton—½ Mile West.. ....164-5, 222
Kimberly 150-1, 222
Kingston 88, 166-9, 222
Kingston—1.7 Miles West.. ....165, 222
Lawton—½ Mile Southwest 89, 213, 222
Lively—1 Mile Northeast.89, 420
Macdonald 89
Manns Creek, Mouth of.... ....196-7, 222
Marting—¼ Mile Southeast 88, 122-4, 222
Maywood—Aldrich Camp... ....202-3, 222
Meadowbridge — 1.5 Miles Northwest 89
Meadow Creek Station...... ....214-15, 222
Meadow Creek—1.5 Miles North 89
Miller 89, 175, 222
Montgomery 88
Morris Creek.........145-6, 222
Mt. Carbon........88, 147-8, 222
Mulvane—1 Mile Southwest 88, 173-4, 222
North Point of Fayette County 88
Nuttallburg.......89, 179-80, 222
Page 88, 162-3, 222
Panther Mountain....141-2, 222
Parral (Summerlee)........ ....88, 89, 186-7, 222

Sections: Page.
Peters Creek—0.7 Mile South of Mouth................ 88
Peters Creek, Mouth of.... ....138, 222
Potato Hill Knob..88, 190-2, 223
Powellton........88, 158-61, 223
Powellton—0.5 Mile Northwest...............156-7, 223
Powellton Fork, Head of.. ....161-2, 223
Quinnimont—North Side... ....211, 223
Quinnimont—South Side.... ....212, 223
Rader Ford, Meadow River 202, 223
Rainelle—1 Mile Northwest 89
Ravenseye 200, 223
Rowlesburg (Preston County) 237-9
Royal..................208, 223
Russellville.......89, 176-7, 223
Schuyler Fork, Morris Creek 146, 223
Sewell—0.9 Mile South..... ....198, 223
Shawver Bridge.......174-5, 223
Shrewsbury (North Coalburg) 116-17, 223
Sievy Bridge Station..204-5, 223
Sims Schoolhouse.....203-4, 223
Smithers..............121-2, 223
South Fayette Station..... ....181-2, 223
Sugar Creek of Laurel..185, 223
Terry..............89, 207, 223
Thurmond 89
Turniphole Mountain...220, 223
Turniphole Mountain — ½ Mile Northwest......219, 223
Vanetta 88, 129-30, 223
Walnut Flat Schoolhouse... ....217, 223
Winifrede Junction..114-15, 223
Winona 89, 178, 223
Wyndal—½ Mile Southeast 88, 131-2, 223

Sections:
Greenbrier County......... 218
Kanawha County......... ....114, 116, 118, 119
Mingo County.......286-9, 926-7
Nicholas County........... ....136, 139, 141, 142, 175
Preston County............ 237
Raleigh County............ ....207, 208, 209

Sections, Fayette County:
Falls District...........113-143
Fayetteville District.....180-195
Kanawha District.......144-169
Mountain Cove District..169-174
Nuttall District.........174-180
Quinnimont District....205-220
Sewell Mountain District.. 195-205

Page.
Sections, General:
  Allegheny Series..........98-99
  Kanawha Group 100-106
  Mauch Chunk Series .. 112
  New River Group.......106-109
  Pocahontas Group ..109-111
  Pottsville Series.........100-111
  Pottsville Series, Revised 917-8

Sections, General and Special (Chapter IV)..............97-223
Sections, Summary of.........220-1
Selp, R. H.................. 847
Selected Reservoir Sites, Kanawha River Basin..........[illegible]
Semi-Centennial History of W. Va.................9, 16, 915

Seth Limestone..............
102, 117, 118, 141, 153, 247, 249, 279, 281, 282, 284, 286, 490, 925, 927, 928
Settle, J. E.................. [illegible]
Sevy, Geo. W. 862
Sewell "A" Coal.........
108, 142, 187, 195, 309, 387, 405, 409, 410, 411, 425, 440, 443, 444, 446

Sewell "B" Coal..........
88, 89, 108, 142, 143, 176, 179, 184, 187, 195, 201, 202, 204, 308-9, 387, 402, 403, 405, 409, 410, 412, 414, 415, 416, 420, 422, 423, 425, 426, 429, 430, 432, 443, 445, xxvi, xxxi

Sewell Coal..................
88, 89, 90, 92, 93, 94, 97, 108, 128, 137, 138, 142, 143, 168, 172, 175, 176, 177, 178, 179, 180, 181, 184, 187, 190, 192, 195, 196, 197, 198, 199, 200, 201, 202, 203, 204, 215, 239, 273, 276, 278, 279, 294, 298, 304, 305, 307, 308, 309, 310-11, 312, 313, 314, 316, 317, 319, 321, 331, 334, 335, 352, 353, 357, 358, [illegible], 369, 370, 373, 375, 387, 388A, 388B, 388C, 396, 397, 399, 401, 402, 403, 405, 406, 407, 408, 410, 411, 412, 413, 414, 415, 416, 417, 418, 419, 420, 421, 423, 424, 425, 426, 427, 428, 429, 432, 433, 435, 436, 437, 438, 439, 440, 441, 442, 443, 444, 445, 446, 447, 448, 449, 676-795, 867, 875-7, 884-92, 897, xxiv, xxv, xxvii, xxviii, xxx, xxxi, xxxii
Sewell Coal, Intervals Above and Below................ 88
Sewell Collieries Co.:
  [illegible] Mine (151)
  ....680-1, 881, 882, 884-5, 895
  [illegible] Mine (152) 681
  [illegible] Mine (177) 682
  [illegible] 175
Sewell Creek 14, 20
Sewell Creek Mine (1??) ....
........[illegible]

Page.
Sewell Mine (175)...........
............187, 198, 783, 881, 882
Sewell Mountain District:
  Area 17
  Bonds Voted for Roads 16
  Detailed Boring Records..
 442-447
  Drainage Basins, Area....37-38
  Lack of Test Wells.......355-8
  Minable Coals............
  ....(See Minable Coals)
  Population 14
  Prospective Oil and Gas Areas 358-9
  Road Mileage 16
  Sections 195-205
  Stratified Shales............ 907
Sewell—0.9 Mile South Section 198, 223
Sewell Valley Railroad.14-15, 339
Sewell Valley Railroad, Levels 933-4
Shady Spring District (Raleigh), Detailed Core Test Records 449-455
Shaffer, Lee 728
Shaft Mines.................... 675
Shale:
  Bolivar Fire Clay.... 98
  Cannelton (Stockton)......257-8
  Dingess 247-8
  Dorothy 270
  Douglas 275
  Eagle 263-5
  Gilbert 270
  Hartridge Black............ 310
  Kanawha Black Flint 273-4
  Lower Iaeger............... 304
  Mauch Chunk Red........332-5
  North Fork 330-1
  Quinnimont 318
  [illegible] 325
  Royal 326-7
  Sandy Huff.................. 307
  Upper Iaeger 290
Shales, Stratified 904-7
Sharon (Upper and Lower Raleigh) Sandstone 139, 314
Sharp, C. C., No. 1 Core Test (4) 388A, 391
Sharp, C. C., No. 2 Core Test (5) 388A, 392-3
Shawver Bridge Section.174-5, 223
Shelton, E. V., No. 1 Well (1) 341A, 342, 347
Sherman District (Boone) Well Records 341A
Sherwood Mine (179) .
.... 773-88, 878, 879, 881-2, 887
[illegible] Coal Co. No. 1 Well (10) 341A
[illegible] Coal Co. No. 2 Well (11) 341A
Shoofly Tunnel 907
Short Creek 78
Shrewsbury (North Coalburg) Section 116-17, 223

Page.
Shuck, G. A.................. 791
Shuck, John Andrew, Opening (515) 792
Shuck, T. A., Opening (513)... 791
Shuck, T. A, Opening (514)... 792
Sievy Bridge Station Section 204-5, 223
Sievy, Geo.................... 820
Signal Knob Coal Co., Signal Knob Mine (53)........379, 574
Simington, F. J.............. 725, 727, 732, 733, 739, 741, 742, 743, 744, 745, 746, 772, 776, 780
Simmons Coal............111, 330
Simpson Entry (200)......... 824-5, 877, 880, 881, 882, 893, 895
Sims, M. J.................... 347
Sims Schoolhouse Section.... ....203-4, 223
Sims Station—Boggs Knob Section 218, 221
Sims, W. H., Opening (574).. 854
Sims, W. H., Prospect (264).320-1
Sims, Wm., Opening (221)... ....217, 218, 320, 877, 880
Sims, Wm., Opening (568).... 849
Site for Brick Plant........905-7
Sites, Selected Reservoir, Kanawha River Basin........ 920
Skaggs, Polly, Core Test (25) 388A, 403
Slab Fork Coal.............. ....(See Beckley Coal)
Slater Coal Co., Slater Mine (204) 828, 877, 880
Slater Creek Entry (215).... ....837-9, 894, 896
Slater Hollow Drift Mine (214) 837, 877, 880, 881, 882
Slater Mine (204)...828, 877, 880
Slater Mine Production....... 377
Smails, G. T., Opening (510).. 791
Smiley, S. A................ 724
Smith, David................. 791
Smith, David, Opening (511).. 791
Smith, Enoch................ 431
Smith, Enoch, No. B19 Core Test (88)..........388B, 439-40
Smith, Enoch, No. B20 Core Test (86).............388B, 438
Smith, Enoch, No. B23 Core Test (87)...........388B, 438-9
Smith, F. N..................388B
Smith, F. N., Core Test (79A) 388B, 431-2
Smith, Green, Opening (365).. 619
Smith, H. I...........683, 706, 708
Smith, John, Opening (297).. 513
Smith, R. M.................. 200
Smithers Creek............34, 38
Smithers Creek Branch, K. & M. R. R................ 13
Smithers Section........121-2, 223
Smokeless Coal & Coke Co.... ....697, 700

Page.
Smokeless Mine (120)....... 181, 697-700, 875, 879, 885, 895
Smokeless Mine (121)....... 700
Smokeless Mine, Production.. 378
Smyth, James M............ 640
Snake Root Coal............ ......(See Little Raleigh Coal)
Snyder, T. H................. 731
Solvay Collieries Co......165, 551
Solvay Collieries Co.:
  No. 1 Mine (86)........629, 641
  No. 1A Mine (87)......629, 642
  No. 2 Mine (88).629, 642, 874, 879
  No. 3 Mine (85)........629, 641
  No. 5 Mine (84)........... ....629, 640-1, 874, 879
  No. 6 Mine (65)...608, 873, 878
  No. 7 Mine (66)........... 608
  No. 8 Mine (67)...609, 873, 878
  Production 379
  Prospect (386)............. 643
  Westerly No. 1 Mine (83)... ....161, 164, 629, 640, 874, 879
  Westerly No. 2 Mine (64).. ....164, 607, 873, 878
South Fayette Station Section 181-2, 223
South Nuttall Mine (131).... ....709-10, 875, 879, 886, 895
South Penn Oil Co..341, 341A, 372
South Side Branch, C. & O. R. R., Levels............... 931
South Side Co. Production.... 379
South Side Co., Southside Mine (133)...712-13, 876, 879, 886. 895
Southside Mine (133)........ ...379, 712-13, 876, 879, 886. 895
South Vulcan Mine (59)...529, 601
Species, Description (Fossils) 289-292
Species, List of............292-3
Spring Coal Co............. 552
Springdale Syncline.......95, 358
Spurs, Minor Anticlinal...... 95
Squaw Sand................. .....337, 339, 340, 355, 358, 365
Squire Jim Coal 111
Stages, River, Maximum, at Charleston 6
Stages, River, Minimum, at Charleston 7
Standard Thacker Coal Co. Mines 286, 288
Star Coal & Coke Co.....388, 388B
Star Coal & Coke Co.:
  Core Test (52)........388B, 404
  Production 379
  Star Mine (153)........... 734-7, 876, 879, 888, 895, 897, 900
Star Nos. 1 and 2 Mines, Production 379
State Auditor.............. 20
State Board of Control...... 22
State Road Engineer......... 909

Page.
Statistics of Coal and Coke Production 374-385
Staton Branch................ 39
Stead, Thos., Prospect (544).. 819
Steam Railroads..............9-15
Steaming Tests:
Eagle Coal.................631-3
Fire Creek Coal............802-5
No. 2 Gas Coal.......544, 558-64
Powellton Coal.............583-9
Sewell Coal 751-4, 773-4
Steele, A. N., Opening (400).. 650
Stephenson, Samuel.......... 176
Stockton, Aaron............. 234
Stockton "A" Coal............ 100, 126, 158, 166, **232-3,** 238, 386
Stockton Coal................ 88, 101, 116, 120, 124, 126, 131, 136, 144, 147, 158, 162, 166, 170, 190, 232, **234-5,** 236, 238, 362, 386, **470-4, 867**
Stockton Limestone.......... 104, 119, 121, 122, 125, 127, 131, 148, 151, 154, 156, 157, 239, **257-8,** 259, 279, 281, 282, 283, 386, 623
Stockton Limestone.......... .....(See Camelton Limestone)
Stone, Available............910-11
Stone, Building.............909-11
Stone, Building, etc., (Chapter XII) 904-924
Stone Cliff Coal & Coke Co.
Mine (189)................. .....821-2, 877, 880, 882, 892, 895
Stone Cliff Coal & Coke Co., Production 379, 384
Stone Cliff Mine, Production.. ....379, 384
Stonewall Coal & Coke Co.:
Exposure (537)............. 814
Terry Mine (205).......... ......206, 207, 814-15, 893, 895
Stover, George.............. 65
Stratified Rocks, Thickness..221-3
Stratified Shales.............906-7
Stratigraphy:
Allegheny Series...........224-9
General and Special Sections (Chapter IV)..........97-223
Kanawha Group..........230-293
Mauch Chunk Series, Mississippian 332-5
New River Group........294-322
Pocahontas Group.......323-331
Straughan, John..............623
Straughan Mine (74)........ ....623-4, 874, 878
Stream Data, Table of.......33-36
Structure, (Chapter III).....86-96
Structure, Contours, Blue (Black) 360
Structure Contours, Green... ....86-7, 254
Structure Contours, Red 86-7, 310-11
Structure, Detailed 90-96

Page.
Structure, Method of Representing 86-90
Stuart Colliery Co..388, 388A, 412
Stuart Colliery Co.:
Beech Creek Mine (93)..... 183, 185, 186, 188, 262, 647, 656-7, 874, 879, 884, 895
Core Test (36A)......388A, 404
Core Test (39)........388A, 404
Lochgelly (Stuart) Shaft Mine (143)............. ......724-6, 876, 879, 887, 895
Mine (93)................ 183, 185, 186, 188, 262, 647, 656-7, 874, 879, 884, 895
Opening (393)............ 646
Production 379
Summerlee (Parral) Shaft Mine (144)............. 413, 726-7, 876, 879, 887-8, 895
Stuart (Lochgelly) Shaft Mine (143) ...724-6, 876, 879, 887, 895
Sugar Camp Mine, Production 379
Sugar Creek Branch, K., G. J. & E. R. R., Levels.......... 935
Sugar Creek Coal & Coke Co.:
Production 379
Sugar Creek No. 1 Mine (169)..776-7, 876, 879, 891, 895
Sugar Creek No. 2 Mine (170) 777
Sugar Creek Nos. 1 and 2 Mines, Production.......... 379
Sugar Creek of Gauley River 34, 39
Sugar Creek of Laurel Section 185, 223
Sugar Creek of New River... 35
Suitable Areas for Reforestation 923-4
Sulphur, Yield of..............542
Summarized Records:
Coal Tests..............385, 388
Coal Tests, Tables.......... ....388A, 388B, 388C
Oil and Gas Wells.........340-1
Oil and Gas Wells, Table..341A
Summary of Available Coal by Districts 867
Summary of Sections........220-3
Summerlee Mine, Production.. 379
Summerlee (Parral) Mine (144) 413, 725, 726-7, 876, 879, 887-8, 895
Summerlee (Parral) Section.. ....88, 89, 186-7, 222
Summers County, Elevations 929
Summers County Well Records 341A, 356-8
Sun Coal & Coke Co........... 747
Sun Coal & Coke Co.,
Sun No. 1 Mine (163) . 747-763, 764, 876, 879, 881, 882, 889-90, 895, 897, 898

Page.
Sun Coal & Coke Co.:
  - Sun No. 2 Shaft Mine (162) 747, 750, 763-4
Sun Nos. 1, 2 and 3 Mines, Production 378
Sunbeury Coal & Coke Co., Sunnyside Mine (104)...... ....684-5, 884, 895
Sunday Creek Coal & Coke Co. 502
Sunday Creek Coal & Coke Co., Opening (364)............ 619
Sunday Creek Coal Co......... ....388A, 501, 508, 617
Sunday Creek Coal Co.:
  - Glen Ferris Mine No. 117 (29).............512, 871, 878
  - Mine (92—Kanawha County Map)................. 116
  - Production 379, 384
Sunday Creek Co............ 501
Sunday Creek Co. No. 1 Core Test (8)..............388A, 389
Sunday Creek Co., No. 2 Core Test (9)..............388A, 389
Sunnyside Mine (104)........ ....684-5, 884, 895
Surface Formation, Present... 97
Suttle, J. M................852, 863
Sycafoose, Ben, Opening (186) 791, 877, 879
Syncline, Clifftop............92-93
Syncline, Lawton............93-94
Syncline, Springdale......... 95
Synclines 91

T

Tables Showing:
  - Area of County by Districts 19
  - Average Gauge Reading of Kanawha River by Months 8
  - Average Gauge Reading of Kanawha River by Years 9
  - Coal and Coke Analyses.869-903
  - Coal and Coke Production by Mines (1916)........377-9
  - Coal Production (1888-1916) 375
  - Core Tests....388A, 388B, 388C
  - Data Concerning Locks and Dams in Kanawha River 3
  - Days Navigation Suspended on Kanawha River...... 2
  - Enrollment at Preparatory Branch, W. Va. University 23
  - Gaging Records, Gauley River 68-75
  - Gaging Records, Kanawha River 41-42
  - Gaging Records, Meadow River 75-83
  - Gaging Records, New River.44-66
  - Indicated H. P. Developed by Gauley River........ 917
  - Indicated H. P. Developed by Gauley River Tributaries 918

Page.
Tables Showing:
  - Indicated H. P. Developed by New-Kanawha River.. 916
  - Indicated H. P. Developed by New-Kanawha River Minor Tributaries 919
  - Invertebrate Fossils from Pottsville Series.........281-2
  - Marine Fossil Horizons, Kanawha Group........279-80
  - Maximum River Stages, Charleston 6
  - Minable Coal Beds......... 385
  - Minimum River Stages, Charleston 7
  - Normal Monthly, Seasonal and Annual Temperature and Precipitation at Beckley 31
  - Normal Monthly, Seasonal and Annual Temperature and Precipitation at Powellton 30
  - Number of Mines by Coal Beds 375
  - Oil and Gas Zones in W. Va. 337-8
  - Order of Production of Coal by Counties.............. 380
  - Order of Production of Coke by Counties.............. 382
  - Population of County by Districts 19
  - Population of Unincorporated Villages..............28-29
  - Production of Coke by Companies (1916)............ 384
  - Production of Coke by Counties (1916).............. 381
  - Production of Coke by Years (1897-1916) 383
  - Property Valuation......... 20
  - Rainfall at Charleston.... 5
  - Range and Distribution of Fossils 281-2
  - Road Mileage by Districts.. 16
  - Sandstone Quarries......... 910
  - Selected Reservoir Sites, Kanawha River Basin... 920
  - Stream Data..............33-36
  - Summary of Available Coal 867
  - Thickness in Feet of Stratified Rocks..............221-3
  - Well Records............. 341A
Table 1—Coal Analyses by W. Va. Geological Survey...... ....869, 871-7
Table 2—Coke Analyses by W. Va. Geological Survey..... ....869-70, 881
Table 3—Coal Analyses by U. S. Geological Survey and U. S. Bureau of Mines..870, 883-894
Table 4—Coal Analyses by U. S. Geological Survey...870, 897
Tar, Yield of................ 542

Page.

Taylor, James.................. 24
Taylor, J. R. C.........538, 539, 630
Taylor, R. C..............556, 574
Taylor, Wm., Core Test (92).388B
Taylor, Wm. H.............. 785
Tazewell Folio (No. 44)..100, 271
Technologic Branch, U. S. Geological Survey.......... 896
Teets, D. D., Jr..............
115, 116, 117, 124, 125, 127, 129, 130, 131, 133, 135, 136, 149, 164, 165, 166, 206, 234, 252, 273, 300, 301, 309, 311, 390, 458, 461, 471, 476, 502, 503, 504, 505, 507, 509, 510, 511, 512, 513, 514, 515, 516, 517, 518, 519, 520, 521, 532, 549, 550, 574, 576, 577, 578, 579, 581, 604, 605, 606, 607, 608, 609, 610, 611, 616, 617, 619, 620, 621, 636, 637, 639, 640, 641, 642, 645, 646, 649, 650, 653, 655, 667, 671, 718, 719, 720, 721, 725, 729, 730, 731, 733, 734, 737, 738, 747, 763, 764, 767, 770, 771, 776, 777, 778, 781, 812, 814, 816, 821, 828, 829, 830
Temperature at Beckley..... 31
Temperature at Powellton... 30
Tenber, Joseph, Opening (347) 578
Terry Limestone.............
.........113, 206, 207, 333, **335**
Terry Mine (205)..........
.......206, 207, 814-15, 893, 895
Terry Section........89, 207, 223
Tests, Briquet:
  Fire Creek Coal.....805-6, 841-4
  Sewell Coal...............
    699-700, 716-17, 723-4, 736-7, 766-7
Tests, Steaming:
  Eagle Coal.....................631-3
  Fire Creek Coal...........802-5
  No. 2 Gas Coal......544, 558-64
  Powellton Coal............583-9
  Sewell Coal.........751-4, 773-4
Thacker Coal, Lower.........
  (See Lower Cedar Grove Coal)
Thacker Coal, Upper.........
  ....(See Cedar Grove Coal.
Thayer & Butler Pembrook Mine (195)................. 818
Thayer Coal & Coke Co......
  ....388, 388B, 388C
Thayer Coal & Coke Co.:
  No. 1 Core Test (106).... 388C
  No. 6 Core Test (109).... 388C
  No. 7 Core Test (110)... 388C
  No. 8 Core Test (107)... 388C
  No. 9 Core Test (100).... 388B
  No. 10 Core Test (105) ... 388C
Thayer Well (16) 341A
Thickness of Stratified Rocks
  221-3
Third Salt Sand........350, 366, 367
Thirteenmile Creek, Indicated H. P. Developed by.......... 919
Thomas, Charles.................. 715
Thomas, Edward D., Prospect (516) 792
Thomas, H. P.............. 812
Thomas (Newlyn) Mine (192)
  ....812-13, 877, 879, 892, 895
Thomas, S. B................ 911
Thompson, A. S.............. 768
Thurmond Coal Co........... 717
Thurmond Coal Co. Erskine Mine (189)..........810, 877, 879
Thurmond, Description......27-28
Thurmond Section........... 89
Thurmond, W. D., Heirs..... 721
Tidewater Railway........... 13
Tincher, J. E................ 695
Tionesta Coal............... 238
Toensfeldt, Kurt.....569, 572, 592
Toney, Harrison, Core Test (53)................388B, 417-19
Toney, Wm................... 661
Tonnage of Coal Available..
  ....867, 868
Tonnage of Coal Mined...... 868
Topographic Features.......84-85
Total Fall of Streams.......33-36
Town District (Raleigh), Detailed Core Tests........432-442
Towns and Industries.......21-29
Towns and Villages, Unincorporated 28-29
Transportation 2-18
Transported Clay...........905-6
Truck Farming............... 20
Tucker, John, Opening (269).. 459
Tucker, R. C...................
  19, 33, 37, 470, 480, 484, 488, 492, 498, 613, 677, 795, 850, 861, xxiv, xxxii
Tuggles, Jno., Core Test (40)
  ....388A, 401
Turkey Creek................. 38
Turkey Creek Mine, Production......................377, 384
Turkey Knob Coal & Coke Co., Turkey Knob Mine (167)..
  310, 770-1, 876, 879, 881, 882, 891, 895
Turkey Knob Coal Co., Production.....................379, 384
Turnphole Mountain ½ Mile Northwest Section......219, 223
Turnphole Mountain Section
  ....220, 223
Twentymile Creek, Indicated H. P. Developed by........ 918
Type Locality of Winifrede Limestone 286-293
Tyree, M. M. 688

U

Unconformities and Absence of Faults.................. 96
Unincorporated Towns and Villages 28-29
United Fuel Gas Co.........,
  ....311, 341A, 343, 346, 371

Page.

United Mine Workers........ 485

U. S. Bureau of Mines...... 374, 506, 508, 518, 539, 543, 557, 558, 582, 592, 618, 630, 631, 634, 645, 656, 682, 683, 685, 686, 687, 689, 690, 693, 694, 695, 696, 697, 698, 701, 706, 707, 708, 709, 710, 711, 712, 713, 715, 718, 719, 720, 721, 722, 725, 726, 727, 728, 732, 733, 734, 735, 737, 738, 739, 740, 741, 742, 743, 744, 745, 746, 747, 748, 749, 750, 764, 765, 768, 769, 771, 772, 773, 776, 777, 778, 779, 780, 798, 799, 800, 801, 811, 813, 814, 815, 817, 822, 823, 824, 825, 826, 827, 832, 833, 834, 835, 836, 838, 840, 844, 845, 846, 847, 869, 870, 882-897, 898

U. S. Bureau of Mines, Tables of Coal Analyses........882-897

U. S. Census........................19, 21, 22, 23, 25, 26, 28

U. S. Engineers........8, 9, 40, 41

U. S. Fuel-Testing Plant, Norfolk, Va..699, 715, 735, 765, 801

U. S. Fuel-Testing Plant, St. Louis, Mo................. 776

U. S. Geological Survey...... 3, 19, 37, 40, 43, 44, 46, 47, 49, 50, 51, 52, 53, 54, 55, 56, 59, 60, 61, 62, 63, 64, 65, 67, 68, 69, 70, 71, 73, 74, 75, 76, 77, 78, 79, 81, 82, 83, 100, 233, 236, 241, 249, 253, 260, 262, 263, 271, 272, 279, 295, 304, 307, 310, 313, 317, 318, 319, 329, 333, 341, 374, 388, 518, 539, 543, 546, 557, 558, 582, 592, 598, 599, 631, 634, 635, 645, 656, 682, 683, 685, 689, 693, 694, 695, 697, 698, 699, 700, 709, 713, 715, 716, 718, 719, 720, 721, 722, 723, 725, 727, 728, 732, 733, 735, 736, 737, 739, 740, 741, 742, 743, 744, 745, 746, 748, 749, 750, 764, 765, 766, 768, 770, 772, 773, 775, 776, 778, 780, 798, 799, 800, 801, 811, 813, 814, 817, 823, 824, 825, 827, 832, 834, 836, 838, 840, 841, 844, 845, 846, 870, 882-897, 914, 915, xxx

U. S. Geological Survey, Levels 936-946

U. S. Geological Survey, Tables of Coal Analyses...882-897

Unminable Coal Beds......... 385

Upper Cedar Grove Sandstone 102, 114, 117, 133, 153, 156, 158, 173, **248-9,** 288, 289, 394, 926, 927

Upper Chilton Sandstone..... 101, 141, 156, 190, 192, **244,** 287, 362

Upper Clarion Coal.......... 238

Upper Coalburg Sandstone... 101, 114, 120, 122, 124, 125, 126, 132, 133, 141, 158, 170, 190, **235-6,** 241, 287, 362, 910

Upper Connoquenessing Sandstone..................238, 239

Upper East Lynn Sandstone 88, 99, 114, 116, 118, 119, 124, 135, 136, 144, 145, 146, **225, 226,** 227, 228, 361, 467, 910

Upper Freeport Coal......98, 237

Upper Freeport "Kidney" Iron Ore 98

Upper Freeport Limestone.98, 237

Upper Freeport Sandstone... 99

Upper Gilbert Sandstone..... 105, 139, 142, 149, 171, 173, 186, 188, 191, 194, **267-8,** 269, 350, 910

Upper Hinton Limestone..... 335

Upper Iaeger Sandstone...... .(See Lower Nuttall Sandstone)

Upper Iaeger Shale.......... 107, **299,** 304, 399, 406, 407, 410, 422, 427, 428, 441

Upper Kittanning Coal....... 88, 99, 136, 144, 146, **225,** 226, 227, 238, 386, 459

Upper Kittanning "Rider" Coal 99

Upper Mercer? Coal......... ....(See Stockton Coal)

Upper Nuttall Sandstone..... 88, 89, 106, 123, 128, 129, 130, 134, 137, 138, 140, 142, 143, 149, 159, 165, 167, 172, 174, 180, 181, 184, 185, 187, 188, 190, 192, 195, 230, 271, 272, 276, 277, 278, 294, **295-6,** 297, 298, 299, 300, 301, 344, 347, 350, 352, 354, 362, 365, 366, 369, 371, 398, 399, 400, 401, 402, 406, 408, 409, 411, 412, 427, 435, 436, 438, 439, 532, 533, 674, 680, 745, 910, 911, xxiv, xxvi, xxx

Upper Pocahontas Sandstone 110, 210, 211, 219, **328,** 329, 430, 865, xxix

Upper Raleigh Sandstone.... 88, 89, 108, 128, 134, 137, 138, 168, 172, 176, 178, 179, 180, 181, 196, 197, 198, 199, 200, 201, 202, 203, 204, 211, 213, 214, 217, 239, 298, 310, 311, 312, 313, **313-14,** 316, 317, 345, 350, 352, 353, 354, 365, 366, 367, 369, 370, 371, 396, 399, 403, 410, 411, 413, 415, 416, 417, 418, 419, 420, 424, 428, 429, 431, 434, 440, 441, 444, 448, 452, 454, 455, 680, 813, 848, 906, 910, 911, 912, 913, xxvii, xxviii, xxxi

Upper Thacker Coal......... ....(See Cedar Grove Coal)

Upper War Eagle Coal...... .....(See Campbell Creek Coal)

Upper Winifrede Sandstone.. 101, 116, 120, 124, 126, 130, 133, 141, 144, 158, 166, 190, **240-1,** 242, 362, 366, 910

Page.

V

Valuation, Property.......... 20
Vandal, Abraham.......... 21
Vandalia 21
[illegible] Section....88, 129-30, 22[illegible]
Vanport Limestone.......... 2[illegible]
Vegetable Products .... [illegible]
Victoria Coal & Coke Co...690, 712
Villages and Towns, Unincorporated 28-29
Virginia Central R. R. 19
Virginian Railway..........13-14
Virginian Railway, Levels... 93[illegible]
Virginias, The...310, 328, 329, 330
Vivian Sandstone.......... 113
Volume I.......... 362
Volume I(a)..........158, 362
Volume II..........
115, 146, 226, 233, 234, 236, 241, 245, 249, 253, 255, 256, 257, 260, 262, 263, 272, 279, 295, 310, 312, 317, 329, 330, 464, 466, 468, 477, 501, 502, 503, 505, 507, 508, 509, 510, 512, 522, 523, 524, 526, 529, 530, 557, 582, 618, 623, 624, 625, 626, 684, 685, 686, 688, 689, 691, 693, 694, 696, 698, 700, 706, 707, 709, 711, 712, 714, 715, 717, 721, 731, 733, 734, 738, 739, 747, 748, 764, 767, 770, 772, 776, 778, 788, 810, 811, 816, 817, 818, 821, 822, 824, 825, 826, 828, 829, 831, 832, 833, 836, 837
Volume II(A)..........
138, 144, 170, 193, 208, 228, 230, 231, 235, 240, 242, 243, 244, 251, 256, 266, 267, 272, 274, 276, 294, 295, 299, 312, 313, 315, 317, 318, 319, 320, 322, 323, 325, 327, 328, 329, 330, 413, 415, 420, 421, 455, 464, 465, 466, 468, 477, 478, 501, 503, 504, 505, 506, 507, 508, 509, 510, 511, 512, 514, 515, 516, 522, 523, 524, 525, 526, 527, 528, 529, 530, 532, 548, 557, 582, 601, 602, 618, 624, 625, 626, 630, 637, 644, 645, 646, 656, 675, 680, 684, 685, 686, 688, 689, 691, 693, 694, 696, 698, 700, 705, 706, 707, 708, 709, 711, 712, 714, 715, 721, 724, 725, 726, 728, 730, 732, 733, 734, 738, 739, 740, 744, 745, 748, 764, 767, 770, 772, 776, 778, 779, 788, 810, 811, 812, 813, 816, 817, 818, 821, 824, 825, 826, 828, 829, 831, [illegible], 846, 847
Volume III .... [illegible]
Volume V .... [illegible]
[illegible], W. [illegible]...548, 631, 772
[illegible] Mine (58[illegible])
384, 394-400, 478, 479, 881, 882, 884, 885
[illegible] Mine Production..379, 384

W

Wake Forest Anticline...... 91
Walker, Dr. John W., Digging (594) 730
Walker, James (Nuttall Estate) Opening (125)..........702-3, 875, 879
Walker, Milton E........855, 865
Walker, Milton E., Prospect (580) 856
Walkup, A. J.......... 865
Walkup, A. J., Opening (599). 864
Walnut Flat Schoolhouse Section..........217, 223
Walters & Peterson 64, 74, 82
War Creek Coal..........(See Beckley Coal)
War Eagle Coal, Lower......
88, 105, 142, 144, 177, 187, 182, 193, 194, **266-7,** 274, 5[illegible]6
War Eagle Coal, Middle..........(See Eagle Coal)
War Eagle Coal, Upper...........(See Campbell Creek Coal)
War Eagle Sandstone, Lower
105, 138, 139, 141, 143, 155, 157, 159, 182, 183, 185, 186, 188, 191, **266,** 268, 655
Ward Heirs No. 1 Well (25) 341A
Ware, Vernon.......... 458
Warfield Coal...........(See Campbell Creek Coal)
Warfield Fault 928
Warren, John.......... 552
Washing Tests of Powellton Coal 599
Water-Power 915-922
Water-Power, etc. (Chapter XII) 904-924
Water-Power, Available 914
Water-Power Resources of W. Va. 915
Water-Resources Branch of U. S. Geological Survey 915
Water-Supply Papers......
40, 44, 46, 47, 48, 50, 51, 52, 53, 54, 55, 56, 58, 59, 60, 61, 62, 63, 64, 65, 67, 68, 69, 70, 71, 73, 74, 75, 76, 77, 78, 79, 81, 82, 83
Water Ways 2-9
Way, K. M. ......
534, 698, 699, 705, 735, 763, 769, 840
Wayland Oil & Gas Co. .....
341, 341A, 355, 365, 366, 367, 368, 369, 372
Weather Bureau Station at Beckley 29-30
Weather Bureau Station at Powellton 28-29
Weidmann, W. C. 569, 572, 592
Weir Sand..........
337, 338, 339, **340,** 346, 348, 350, 351, 352, 353, 355, 359, 363, 367, 368, 369, 371

Page.
Weirwood Mine, Production.. 378
Weirwood Shaft Mine (174) 192, 195, 298, 423, 782-3, 876, 879
Welch Coal.................. 89, 108, 172, 181, 203, 311, **312-13**, 387, 403, 417, 440, 444
Welch, M. B................ 522
Welch Sandstone............. 108, 179, 181, 203, **311**, 312, 403, 406, 420, 424, 428, 431, 444, 772, xxvii, xxviii, xxxi
Well Records and Prospective Areas 340-373
Wells by Nos.:
  1..............341A, 342, 348
  2..........341A, 342, 348, 349
  3.................341A, 342-3
  4...................341A, 343
  5..............341A, 343, 349
  6...135, 136, 338, 341A, 343, 349
  6A.............341A, 344, 349
  7.................341A, 343-4
  8............339, 341A, 345-6
  9......................... 133, 134-5, 336, 339, 341A. 346, 348
  10........122, 123-4, 341A, 346
  11......................... 336, 339, 340, 341A, 347, 350-1, 352, 357
  12.........341A, 347, 351-2, 364
  13.................341A, 346-7
  13A.................341A, 347-8
  14..157, 159-161, 341A, 352-3, 354
  15................339, 341A, 353
  16 ....341A
  17 and 17A.......341A, 356, 373
  17B.................341A, 357-8
  18..............341A, 354-5, 373
  19.....................341A, 365
  20.........339, 341A, 366-7, 500
  21.........341A, 364, 367-8, 372
  22.........341A, 364, 368-9, 372
  23.................341A, 369-70
  24.......................341A, 372
  25 and 26..................341A
  27.....................182, 341A
  28..........................341A
  29.........341A, 364, 371-2, 372
  30...............341A, 364, 372
  31.....341A, 348, 364, 370-1, 905
  32...............341A, 364, 372
  33, 34, 35, 36, and 37.......341A
  38, 39, 40, 41, and 42.......341A
  43, 44, 45, 46, and 47.......341A
  48...................341A, 362-3
  49..........................341A
  50.....................341A, 360
  51..........................341A
  52...........341A, 359, 360, 361
West Penn Oil Co........341, 341A
W. Va. Coal Land Co.........639
W. Va. Department of Mines 375, 690
W. Va. Oil and Gas Horizons.336-8
W. Va. Oil and Gas Zones, Table 337-8

Page.
W. Va. University, Preparatory Branch...............22-23
Westerly No. 1 Mine (83).... ......161, 164, 629, 640, 874, 879
Westerly No. 2 Mine (64).... ....164, 607, 873, 878
Westerly No. 2 Mine (88).... ....629, 642, 874, 879
Westerly No. 5 Mine (84).... ....629, 640-1, 874, 879
Westerly No. 6 Mine (65).... ....608, 873, 878
Westerly No. 8 Mine (67).... ....609, 873, 878
Whipple Mine, Production... 379
Whipple Shaft Mine (157)... ....742-3, 889, 895
Whitaker, R. B............... 549, 550, 605, 637, 638, 642, 643
White, Charles, Core Test (94) 388B
White, David................ 279, 656, 685, 772, 811, 817, 822
White, I. C.................. 115, 138, 144, 146, 170, 208, 225, 226, 228, 230, 231, 233, 234, 235, 236, 240, 241, 242, 243, 244, 245, 249, 251, 253, 255, 256, 257, 260, 262, 263, 266, 272, 274, 276, 279, 294, 295, 299, 310, 312, 313, 315, 317, 318, 319, 320, 322, 323, 325, 327, 328, 329, 330, 363, 413, 464, 465, 466, 468, 477, 478, 501, 503, 505, 507, 508, 509, 510, 511, 512, 514, 515, 522, 523, 524, 525, 526, 527, 528, 529, 530, 532, 538, 557, 575, 582, 601, 602, 603, 617, 618, 623, 624, 625, 626, 630, 637, 644, 646, 656, 675, 680, 683, 684, 685, 686, 688, 689, 691, 693, 694, 696, 698, 700, 705, 706, 707, 709, 711, 712, 713, 714, 715, 717, 719, 720, 721, 722, 724, 725, 726, 727, 728, 730, 731, 732, 733, 734, 735, 738, 740, 741, 742, 743, 744, 745, 747, 748, 749, 764, 765, 767, 770, 772, 776, 777, 778, 779, 780, 788, 799, 800, 810, 811, 812, 813, 815, 816, 817, 818, 821, 822, 823, 824, 825, 826, 828, 829, 831, 832, 833, 834, 836, 837, 841, 845, 846
White Oak Branch, C. & O. R. R......................12-13
White Oak Branch, C. & O. R. R., Levels.............. 931
White, W. H................. 65
Whitehead, John.........731, 733
Whiteoak Creek.............. 35
Whiteoak Fuel Co.:
  Carlisle Shaft (158)....... ..189, 190, 743-4, 745, 889, 895
  Oakwood Shaft (159)...... ..744, 745-6, 876, 879, 889, 895
  Production 379
  Scarbro Shaft (160)........ ......746-7, 889, 895, 897, 898

Page.

Whitcoak Fuel Co.:
  Sherwood Mine (173)......
  ...779-80, 876, 879, 891-2, 895
  Whipple Shaft (157).......
  ....742-3, 889 895
  Wingrove Shaft (156).....
  ......741-2, 875, 879, 889, 895

Wickham, General William C. 10
Wilderness Lumber Co. Opening (126)........703-4, 875, 879

Wm. Beury-Cooper Co....... 784
William, Jas., Core Test (71)
........................388B, 401
Williams, A. D.........15, 16, 909
Williams Coal Co........... 359

Williams Coal Co.:
  No. 1 Well (52).........
  ....341A, 359, 360, 361
  No. 2 Well (47)............341A
  No. 12 Well (50)......341A, 360
  No. 13 Well (48)....341A, 362-3
  No. 36 Well (42)..........341A
  No. 40 Well (49)..........341A
  No. 50 Well (45)..........341A
  No. 54 Well (46)..........341A
  No. 56 Well (43)..........341A
  No. 60 Well (44)..........341A

Williams, C. G............... 516
Williams, Frank............. 527
Williams, R. Y..............
  694, 697, 700, 709, 713, 798, 823, 824

Williamson Coal............
  102, 117, 118, 120, 125, 126, 147, 152, 153, 162, 167, 171, 173, 247, **248,** 286, 288, 289, 386, 389, 394, 925, 926, 927, 928

Williamson Sandstone........
  102, 118, 120, 133, 153, 173, 246, **247,** 926, 927

Willis Branch Coal Co.:
  Mine (56)................
  ....192, 193, 554-6, 873, 878
  Mine (90)................
  194, 644-5, 874, 879, 881, 895
  Production................ 379
  Prospects (359 and 360)... 612

Willis Branch (Herberton) Section........88, 89, 193-5, 222

Willis Branch Mine, Production......................... 379
Wilson, Henry, Opening (440A) 667
Wilson, J. W................. 741
Wilson, Martin, Opening (412) 654
Winding Gulf Coal..........
..........(See Beckley Coal)

Windsor, Chas................ 25
Wingrove Shaft Mine (156)..
.........741-2, 876, 879, 889, 895

Winifrede Coal..............
  88, 101, 113, 114, 115, 116, 118, 120, 124, 126, 132, 133, 158, 162, 166, 171, 190, **241,** 242, 243, 244, 246, 249, 250, 362, 366, 386, 394, 470, **480-3,** 484, 485, 488, 867
Winifrede Coal, Lower.....
  101, 114, 117, 118, 120, 166, **242,** 386
Winifrede Junction Section...
......................114-15, 223
Winifrede (Buffalo Creek) Limestone ....
  101, 112, 119, **240,** 243, 279, 281, 282, **286-93**
Winifrede (Indian Gap) Limestone ....
  101, 120, 190, 192, **243-4,** 279, 281, 282, 283, 284, 285, **286-93,** 386
Winifrede Limestone, Type Locality of.............286-293
Winifrede Sandstone, Lower..
  101, 120, 133, 137, 147, 158, 190, **242,** 366
Winifrede Sandstone, Upper..
  101, 116, 120, 124, 126, 130, 133, 141, 144, 158, 166, 190, **240-1,** 242, 362, 366, 910
Winona Quadrangle, Levels..945-6
Winona Section.......89, 178, 223
Wiseman, Alexander, Opening (268) 459
Wolf Creek................35, 38
Wolflin, H. M...............
  686, 728, 732, 737, 740, 748, 761, 768, 770, 772, 778, 822
Woods, Bailey................ 24
Woods Ferry—Albion Section
.....................139-140, 221
Wright Coal & Coke Co. No. 2 Mine (206)............. 828
Wright, George (Meadow River Lumber Co.) Opening (495). 787
W. R. Johnson Coal Co......
..........(See Johnson, W. R.)
Wyndal—½ Mile Southeast Section...........88, 131-2, 223
Wyoming-McDowell Report...
  87, 99, 172, 230, 252, 257, 260, 265, 267, 268, 270, 271, 272, 273, 274, 276, 295, 297, 303, 305, 307, 311, 318, 321, 322, 324, 325, 327, 328, 329, 330, 333, 662, 672

Y

Yield of Gas................541-2
Yield of Tar, Ammonia, Sulphur and Naphthalene ... 542

Z

Zones, Oil and Gas, in W. Va. 357-8